

This Week in The Iron Age

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Big Business and Little Plants

THE Defense Program is big business. Where do little companies fit into big business?

This is a question that is perplexing the management of many thousands of small concerns throughout the United States today. These people want to do their bit for Uncle Sam. Also, they want their proper share of defense production so that they can survive and have a chance to grow into larger concerns after things get back to normal.

We want these small plants to survive and grow larger. And we want new small companies to come into the picture with the same frequency and opportunity of success that they have had in the past. That is the way American industry grew. It started with acorns, not oaks.

There are about 166,000 individual manufacturing concerns in the United States. In the matter of defense contracts, our Government has dealt with not more than 1000 or so of them. This is not criticism; it couldn't be helped. The way to get things started as fast as possible was to place as many big orders as soon as possible. And that meant with the larger companies. It would be a physical impossibility for our Government to deal directly with thousands of small concerns. Negotiations and follow through would necessitate an impossible expansion in the Government organization.

The theory and the hope is that through subcontracts, placed by the original large concern contractors, plenty of work will trickle down and fill the available small plant capacity. In some localities, Detroit for example, where the big fellows are well acquainted with their smaller neighbors, it will probably work out without much difficulty. But there will be nine cases in ten where it won't work out unless something is done about it.

Unless we keep an activity balance between our big plants and little plants, the latter are going to seriously lose their relative position in our scheme of things. We will come through with our big plants stronger and larger, and our small plants smaller and weaker. That will not be good for the America of tomorrow.

Government realizes this situation and has taken steps to aid the smaller concerns through the Federal Reserve system. But that's not enough. The smaller plants that want defense work should organize by communities, preferably through their chambers of commerce and go after it. There will be enough work to go around; the question is: "Who is best fitted to make what?"

J. H. Munroe



A Sound Raw Material Program Leads to **INLAND QUALITY STEEL**

One of the most important means used by Inland to produce steel of highest quality is a program which assures continuous flow of uniform raw materials. This Inland practice is illustrated by the great care taken in selecting, mixing and blending basic iron ore.

To assure uniformity and continuity of supply, Inland owns large ore reserves of known quality. These are mined by methods which avoid inclusion of impurities. Every car of ore, used by Inland, is sampled as it leaves the mine. When these cars are dumped into pockets at the upper lake docks, the highest and lowest in different elements are evened out with infinite pains by blending. Further mixing occurs when the ore flows into the steamer.

The ore is mixed a third time during the process of unloading and piling at the mill. Again, when loading the skips that feed the Inland blast furnaces, the grabs that dig through the ore accomplish a final mixing.

Equally important are Inland's large stocks of specialty ores that allow adjustments up or down in manganese, phosphorus, silicon and other elements to meet manufacturers' special requirements for particular products.

Throughout this program, uniformity is the watchword of the Inland organization. It begins with the mining of raw materials at distant points and follows through every step of the Inland process of making quality steel.

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Radiographs in the Modern Manner

*—Describing a lead foil technique which
permits decrease in exposure time and
which also brings out clear cut detail*

By ROBERT C. WOODS
*Physicist, Bell Aircraft Corp.,
Buffalo, N. Y.*

• • •

RAPID as has been the development of industrial X-ray applications in the past decade, tremendous impetus has been given this field by the rigid testing specifications recently laid down by the United States Government for examination of aircraft and other materials for national defense. Indeed, it seems quite probable that the next 12 months will see the scope of X-ray testing extended so as to disclose many properties of metals now discernible only by more tedious and destructive methods.

While this growth has not resulted

in any important advance in the X-ray machine itself—nor is it likely to do so—it has fathered several improvements in technique and in the appurtenances used to increase radiographic quality. One of the foremost of these improvements has been the use of metal foils for the elimination of X-ray secondaries and back scatter and for intensification of X-ray image.

In order to grasp clearly the implications of this recent advance, consider briefly some properties of the time-honored calcium tungstate intensifying screen.

As early as 1895, Roentgen himself observed that some chemicals were excited to visible fluorescence under exposure to X-radiation. On impact with crystals of certain salts, part of the energy in an X-ray beam undergoes a transformation in the direction of longer wave lengths and appears as visible light. This phenomenon has

been put to good use to intensify the effect of X-rays on the emulsions of photographic films.

A finely divided layer of fluorescent calcium tungstate crystals is deposited on a cardboard-like backing and then covered with a film of transparent cellulose material as a protective coating. In application, the screen is placed with its chemically covered side in direct contact with the bare film emulsion and both are enclosed in a light-tight envelope or holder. Under X-ray exposure, the calcium tungstate screen emits visible light wherever X-rays have bombarded its crystals and this light, being emitted in close contact with the film, naturally produces a corresponding image in the photographic emulsion. Now since X-rays themselves also produce photographic images on films, the fluorescent screen image is clearly nothing more than a reinforcement of the first. Actually,

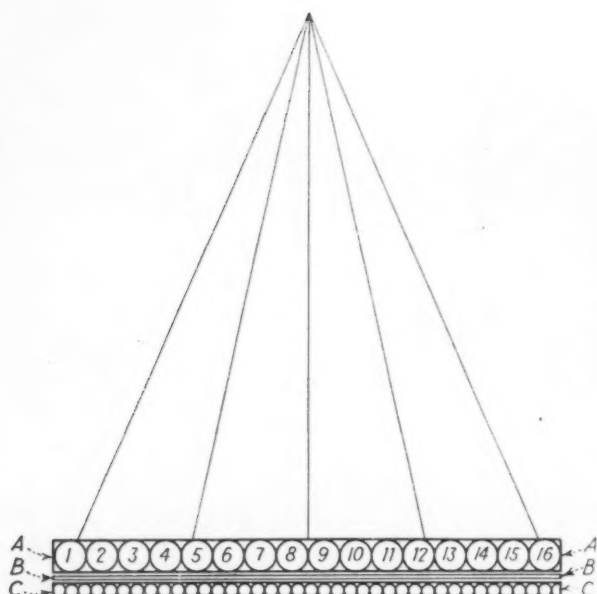


FIG. 1 — Effect of tungstate crystal fluorescence on film emulsion grains. A is a layer of calcium tungstate crystals, B is a translucent protective film covering A, and C is coating of photographic emulsion grains on the X-ray film.

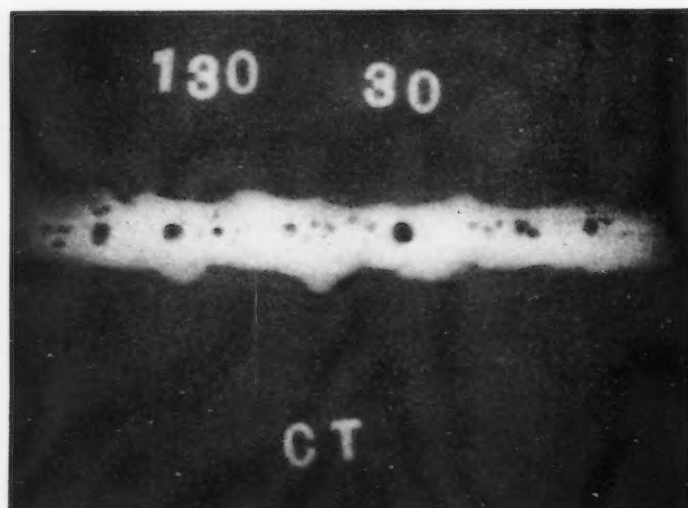
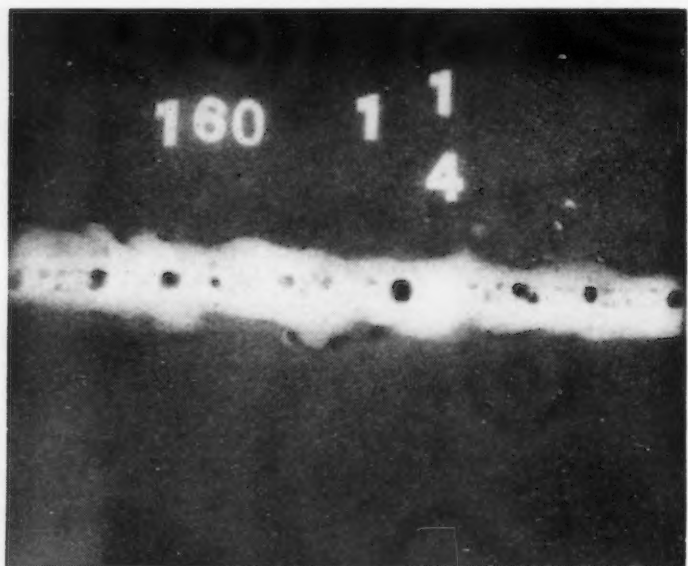


FIG. 2—Two radiographs of a butt weld. (A—Above) Taken with calcium tungstate screens. (B—Below) Taken with the lead foil method described herein.



however, the photochemical effect of the visible light is by far the stronger, the intensification factor being as high as 200 in some instances.

Quite evidently, then, when an object is radiographed using a screen-film combination, its image will be faithfully reproduced except that a great deal less radiation intensity will be required to produce an equal amount of film blackening. In short, dense objects, which would ordinarily require long exposure for inspection, may be penetrated in a fraction of that time by recourse to calcium tungstate intensification. In practice, two such screens are commonly used, the film being sandwiched between them. The rigid, metal, light-tight holders in which screens are mounted are known as cassettes.

At first glance, a device and method such as described may seem an almost ideal condition of affairs, but unfortunately there are drawbacks, which at times can be fairly serious. For one thing, the crystals of calcium tungstate on the screen are much larger than the silver bromide grains of the photographic film. This means that every time a single tungstate crystal fluoresces, it affects a large number of emulsion grains, as illustrated by the exaggerated view in Fig. 1. In Fig. 1, A is a layer of calcium tungstate crystals, B is a translucent protective film covering A, and C is the coating of photographic emulsion grains on the X-ray film. As a result of this condition, no distinct line of demarcation appears on the film, one density more or less fading into the other.

Unfortunately, this bigness of grain cannot be modified too much. When the grains are small, the speed of their fluorescent reaction is slow and there is an increase in lag or afterglow. The larger the grain size, the faster is their response to X-rays — which also brings with it the disadvantage just discussed. As a result, research on fluorescent screens is a constant struggle to raise the speed of reaction and yet keep the diffuseness of image to a minimum. It might be mentioned that such efforts are being rewarded by continual advances in the quality and usefulness of both intensifying and fluoroscopic screens.

Secondly, a sort of powder train phenomenon undoubtedly occurs under the stimulus of X-rays. That is, short wave fluorescent rays and ejected photoelectrons from one particle excite neighboring crystals to fluorescence. Referring to Fig. 1 again.

suppose the actual limit of an incident X-ray beam extends from crystal 4 to crystal 12. The fluorescence emitted from 4 tends to excite 3, which in turn has a lesser effect on 2, and so on. Crystals adjacent to 12 also behave similarly.

Then too, although protective coating B is thin, it does allow a minute amount of light reflection to take place within itself.

While no one of these phenomena is too grave a matter, all three taken together do produce a diffuseness of detail and outline which measurably detract from the diagnostic quality of the radiograph.

Perhaps the greatest disadvantage of the calcium tungstate screen, how-

to be discussed. It will be noticed that the blowholes in the weld show up well in both films.

In the radiography of irregularly shaped objects, shielding is generally tedious and often impossible.

Two of the main problems, therefore, are to *decrease excessive exposure times on dense objects and yet bring out clear cut detail.* From the foregoing discussion, it may

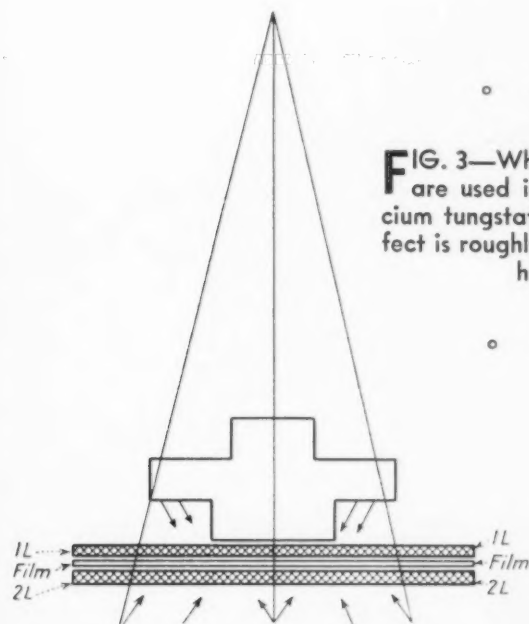


FIG. 3—When lead screens are used in place of calcium tungstate ones, the effect is roughly that as shown here.

ever, is the fact that it intensifies not only the direct, primary radiation components which make a true record of conditions within the object being examined, but it also intensifies the softer, less penetrating rays scattered from and emitted by the object. This latter type ray adds nothing to the picture except a general fog, thus tending to obscure outline and detail.

Where it is possible to surround the object completely with a substance opaque to X-rays, the problem of scattered radiation is not quite so serious. An ideal shielding condition occurs in the butt weld. In this instance, the weld itself is the object under examination and is surrounded by metal fused right to it. Figs. 2A and B are two radiographs of a butt weld. A is taken with calcium tungstate screens and B with the lead foil method about

appear these two factors are hardly compatible, but the advent of lead foil intensifying screens has made possible a fairly satisfactory compromise.

Use of lead foil screens is based on two factors; partial filtration of scattered and secondary radiation, and photographic image intensification by electron emission. Two sheets of 0.005-in. lead foil fastened on semi-rigid backings can be mounted in cassettes

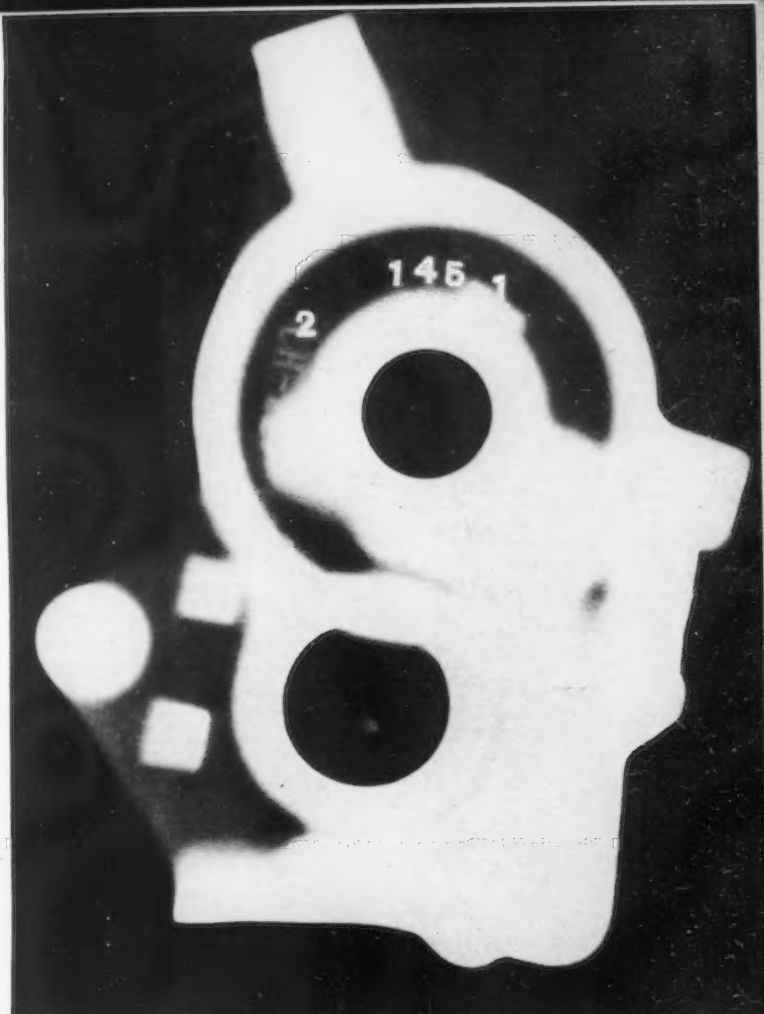
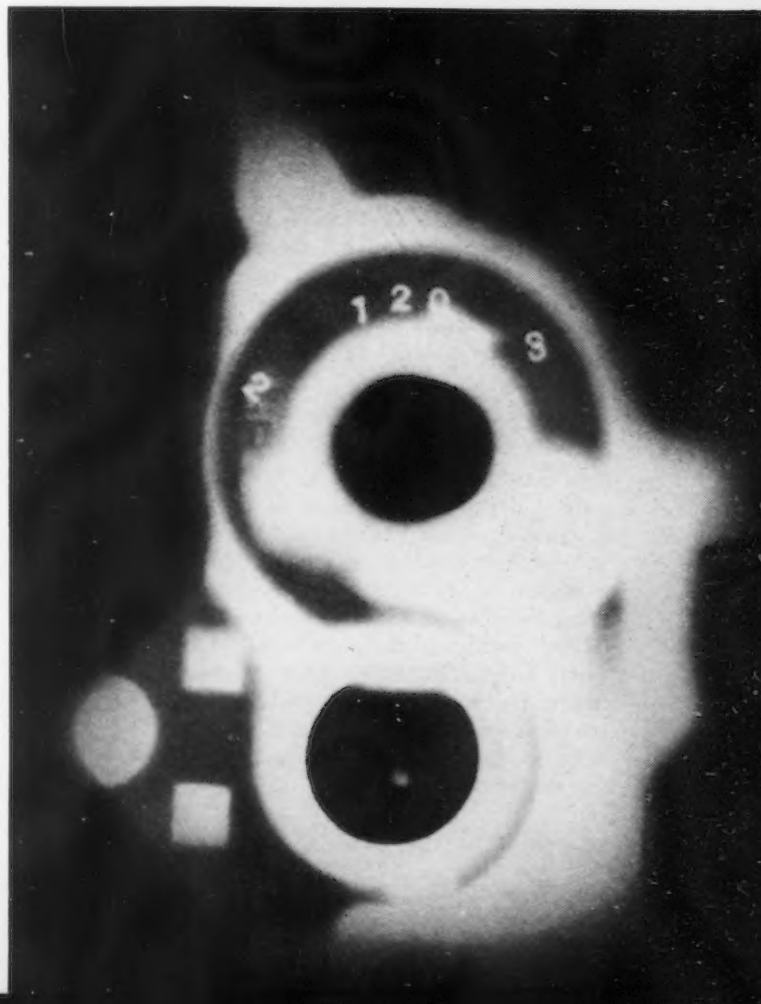


FIG. 4 A—Radiograph made using lead screens and the exposure regulated to give the predetermined photographic blackening, or density, most suitable for examination.

FIG. 4 B (Below)—Same as Fig. 4 A, but secondary and scattered rays are not filtered out.



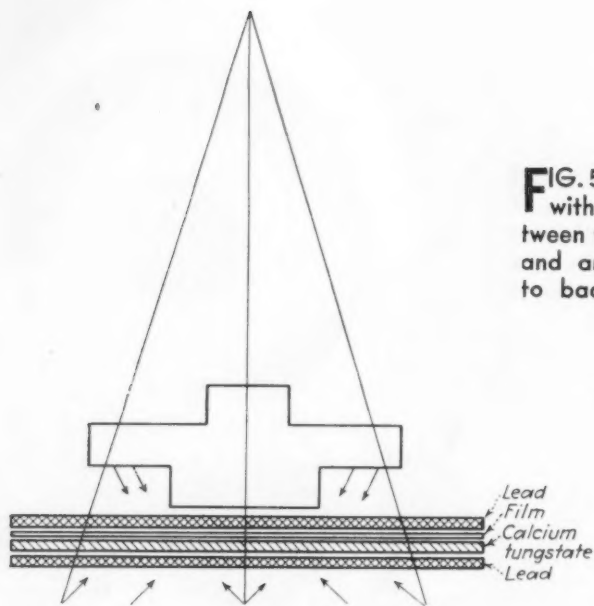


FIG. 5—Cassette loaded with lead foil screen between the object and film, and another lead screen to back up the calcium tungstate.

and handled the same as calcium tungstate screens.

When lead screens are used in place of calcium tungstate ones, the effect is roughly that as illustrated in Fig. 3. C is a casting of uneven shape set on a cassette loaded with an X-ray film, F, between two lead foil screens 1L and 2L. After passing through the flanges on casting C, the X-ray beam is composed of primary radiation plus a large quantity of longer wave length scattered rays, and soft secondaries emitted by the object itself.

The scatter and secondaries, however, being generally less penetrating than the original beam are largely absorbed by lead screen 1L. This process eliminates much of what might be called helter-skelter radiation which overlays the true image with a secondary blanket of fog.

The filtration role played by the rear screen, 2L, is also illustrated in the same figure. Some of those rays which pass completely through the casting and cassette, then strike surrounding objects and are scattered back toward the film. If this back scatter is not absorbed by a device such as screen 2L, it will produce a further fogging of the image.

It is well known that electron impact will expose the grains of photographic emulsions, exactly as do photons of light or X-rays, and this phenomenon is here utilized to obtain some measure of X-ray intensification. The mechanics of the phenomenon are fairly similar to those of the calcium tungstate screen, except that photoelectrons discharged from the lead surface next to the film are substituted for fluorescent light rays. But each elec-

tron is very small compared to a calcium tungstate crystal and so does not expose large numbers of emulsion grains. Neither are emitted electrons open to the powder train or reflection disadvantages. The outstanding drawback is that two lead screens produce only an intensification of two to one over no screen practice, as compared to one hundred or more for calcium tungstate.

Even so, the increased radiographic quality obtainable with lead screens in general offsets the other necessary increases in voltages and exposure time. A study of the steel casting radiographs in Fig. 4 clearly illustrates the value of lead screen practice.

Fig. 4A was made using lead screens and the exposure was regulated to give the predetermined photographic blackening, or density, most suitable for purposes of X-ray examination. The relative density of photographic images is accurately measured by an instrument called a microdensitometer, which gives comparative readings based on an almost universally used scale known as an H and D density curve. It will be noticed in Fig. 4A that the general detail is good with clearcut edges. The lead figures show up distinctly, indicating that most of the radiation recorded on the film is composed of primary X-rays which have penetrated the object in a direct line. As previously discussed, this is the desirable type of radiation.

Fig. 4B is a good illustration of what happens when secondary and scattered rays are not filtered out, but are recorded and their image intensified along with primary radiations by a pair of calcium tungstate screens.

Edges of the casting appear quite fuzzy and the lead letter is far from distinct, as in Fig. 4A. However, the actual photographic density in identical areas of the two radiographs is exactly the same. Moreover, there are absolutely clear areas in Fig. 4A where the density of the casting was such as to absorb all the X-rays before reaching the film. In Fig. 4B these same areas are not clear, but look as though the metal at those points had been penetrated, and under some circumstances these areas might pass as having been X-rayed. Actually, this means that part of the exposure in Fig. 4B is due to some type of radiation other than direct primary and as a result is somewhat fogged. Conversely, the distinctness of the first film means that detrimental secondaries and scattered rays have been mostly removed.

While all this forms an effective argument for the use of lead screens, it still leaves unsolved the problem of overlong exposures. Most fortunately, a fairly satisfactory compromise may be effected by the combination of lead and calcium tungstate screens. In the first place, if only one calcium tungstate screen is used, instead of two, there is a considerable decrease in the bad effects due to intensifying crystal size, powder train fluorescence, and multiple reflections between screen and film. This conclusion follows logically from the fact that the causes contributing to these phenomena have been cut in two. Of course, nothing has yet been done to eliminate the evil of intensified secondaries, scatter and back scatter, but this can be taken care of by placement of a lead foil screen between the object and film, with another lead screen to back up the calcium tungstate. A cassette loaded for this technique is arranged as indicated by Fig. 5.

Such a method filters out secondary and scattered rays just as efficiently as lead screens alone, but it has the advantage of retaining 50 per cent of the intensification value of calcium tungstate screens. Thus an object which would normally require a 1-min. exposure for X-ray examination with two tungstate screens, would need a 2-min. exposure using the combined lead and tungstate screen technique. In all cases where exposure times are reasonable anyway, the doubling of this value will certainly not prevent serious obstacles, because as a rule this factor is only a small percentage of the time consumed in industrial X-ray work.

Figs. 6A and B shows the marked improvement in radiographic quality to be expected when a combination of

lead foil and calcium tungstate is used rather than the tungstate alone.

In conclusion, a word of explanation might be appropriate relative to a remark made early in this discussion; namely, that no important advance in the X-ray machine itself need be expected as a result of recent industrial radiographic growth. No truly radical change in the method of X-ray production has been made since the invention of hot cathode, highly evacuated X-ray tubes in 1917.

This does not imply, of course, that no further advance is possible, but in view of what is now known of X-rays it just seems unlikely. And even if some revolutionary new way of producing X-rays were discovered, it would not necessarily mean any great advance industrially, simply because the X-rays would still be the same old type of radiation with which technicians are accustomed to deal from day to day. Of more practical importance would be some startling innovation in methods of handling the X-ray beam itself; for example, a more efficient system of X-ray filtration, a satisfactory method for enlargement of X-ray images during exposure, or any other improvement which would make the X-ray more valuable in its present applications and extend it to cover entirely new fields.

And so it is to such developments that most industrial X-ray research workers are devoting their energies. Merely to satisfy a set of testing specifications should not be enough for those manufacturers who have a sincere desire to witness the advance of industry. For after all, increased knowledge of what might be termed various states of material defectiveness is an important factor in the advance of modern civilization and in the preparation for the defense of it.

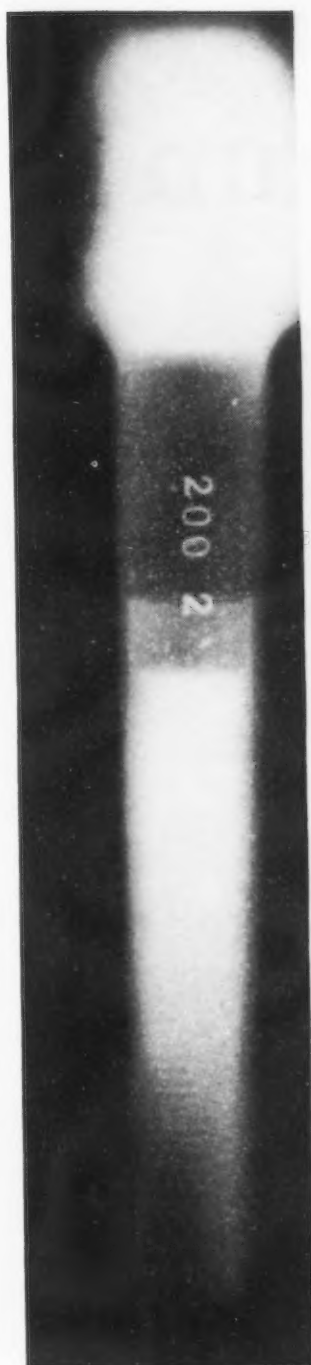
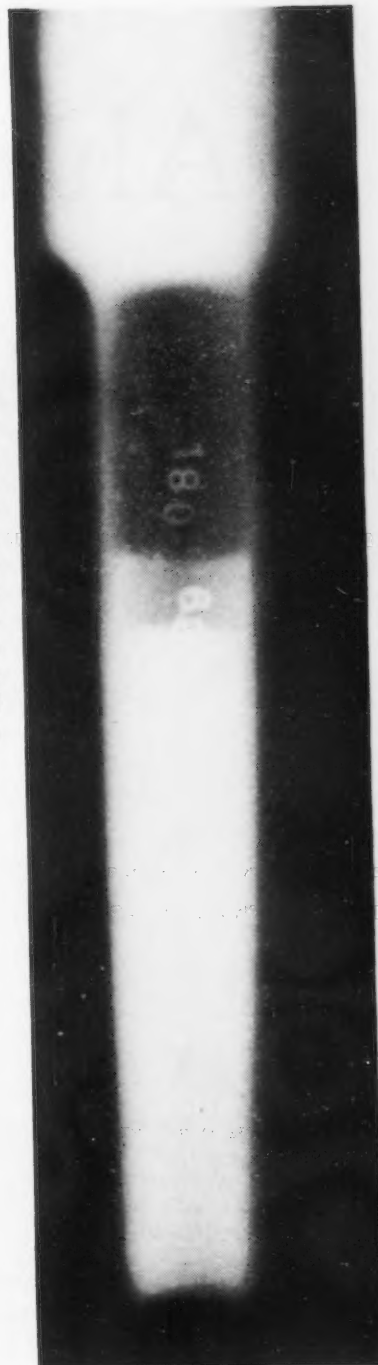


FIG. 6—Marked improvement in quality through use of lead foil. (A—left) Calcium tungstate screens alone; note poor detail and fog. (B — right) Calcium tungstate and lead screens; improved detail and elimination of fog.



Aluminum Alloy Extrusion

By ERNEST V. PANNELL

THE technique, equipment and metallurgy of extrusion is becoming increasingly important, what with the current heavy demands for aircraft shapes in light alloys, and some makers of steels in this country considering this method of production. The author has been observing aluminum alloy extrusion in England for many years, and herein describes direct, inverted, and tube extrusion; compound dies, composite metal extrusion. Last week, attention was directed to extrusion equipment and die materials used.

DIRECT extrusion: Turning from the presses to the process itself, it should first be noted that the metal dealt with is always in a solid or semi-plastic form and the laws of fluid pressure applying to such a process as die casting do not hold. As the plunger moves forward the hot metal billet tends to move before it and the part immediately opposite the die is sheared off and extruded. At the same time metal feeds in radially to the center just in front of the moving pressure pad and this action continues up to the end of the stroke. The operation is completed when all but 1 or 2 in. of the billet has been extruded, the residue forming the "slug" which is left in the container.

In the case of aluminum alloys an important factor is the skin of oxide which surrounds the billet. The friction of this skin on the container wall is very high and if the correct clearance is used on the following pad the latter will shear the metal just inside the skin leaving the latter as a "skull" in the bore. If, on the other hand, the pad approximates to a fit in the con-

tainer, the skin will tend to buckle and turn over at the rear end; it will then extrude with the last portion of the rod and may render the latter unsound. (See Fig. 5.) The effect is to produce a thin tube of oxide surrounding a core of solid metal, which latter may even be pushed right out of the rod.

Some valuable studies of this defect have been made by the leading British authority, Dr. R. Genders, who has explained the effect on the lines just indicated. On the other hand, the late Dr. W. Rosenhain held the view that any unsoundness was due to imperfect casting and piping of the billet itself, and he recommended that the latter be charged with the head next the die and also that the follower pad should be corrugated to hinder the radial flow of the oxide to the center. The general opinion is in favor of the theory of Genders, and the following precautions are now taken to secure the maximum soundness and homogeneity of the extruded rod: (a) a reasonable degree of reduction of 8:1 or more (Fig. 4); (b) use of clean

billets carefully poured and fed; (c) ample clearance of the pressure pad; and (d) where possible the use of a multiple die to decentralize the product. If suitable practice is followed, it will be found that unsoundness is confined to the front and rear end of the extruded rod where it can be cropped and discarded. Generally the soundest product is that with the thinnest sections even though the shape be a complicated one.

Some British authorities are in favor of some method of lubricating the billet to reduce its friction on the container wall, but it has not yet been found that any lubricant will stand up to the heat and pressure employed. Apart from this difficulty it would have the effect of permitting the oxide skin to travel more freely and to be turned in by the follower and extruded. As already seen, this is a probable source of unsoundness and the better practice is to allow the skin to cling to the bore.

The temperature of extrusion varies according to the metal being pressed. Pure aluminum becomes very plastic

under pressure and can be worked fast over a wide range of temperature; it is usually pressed at from 850 deg. to 920 deg. F. As might be expected, the extrusion pressure falls off rapidly with increasing temperature. The same is true of the heat treated alloys, but in view of the narrow critical range of temperature this does not allow much latitude. Metals of the Duralumin and Hiduminium class are pressed at 720 deg. to 780 deg. F., using from 50,000 to 60,000 lb. per sq. in. pressure. Owing to the hardness of the alloys extrusion is extremely slow, but any attempt to accelerate it would result in dangerous pressures being reached. A complete Duralumin billet may require 30 min. for complete extrusion; this being, of course, less if the reduction is small.

INVERTED EXTRUSION: According to the authority, Genders, already quoted, the direct process is wasteful of energy and yields an imperfect product. It is stated that from 30 to 50 per cent of the power applied is used in forcing the billet along the length of the container and in internal friction. If the die, mounted on a hollow plunger, is pressed into the billet the plastic metal is in motion only at the die opening; there is, moreover, no disturbance of the oxide skin, and the central core of the rod is invariably sound. (Fig. 6). Following the lower operating pressure, the strain on the container, die and all working parts is correspondingly reduced.

Another merit of the inverted process is the more thorough utilization of the billet since the only discard is the thin shell around the bore of the container. As a result a number of authorities openly assert this method to be superior to the direct process, a tendency to minor surface defects being its only drawback. It must be noted, however, that the mounting of the die on a hollow plunger introduces problems of its own. Not only is a rigid mounting difficult to obtain but the size of rod extruded is strictly limited owing to the wall thickness of the plunger. Furthermore, experiments on water cooled dies are in progress which show promise of accelerated production, but such cooling will obviously be possible only with a stationary die. The indications are, therefore, that while the direct process will continue to predominate in commercial production there is a distinct field for the inverted method, and the advantage will lie with presses which are designed to operate by both methods. In a press where the container has full horizontal motion (as in Fig. 3, shown last week) the die is mounted

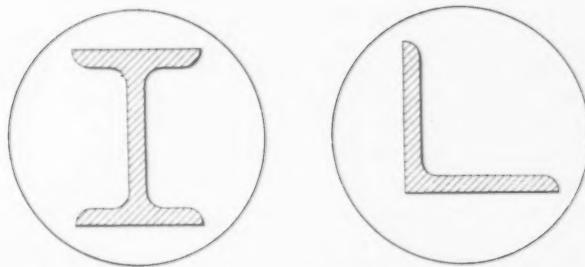


FIG. 4—Structural sections produced in a Schloemann press with 16-in. container. (Left) 11-in. "I" beam 33 ft. long; reduction 8½:1. (Right) 9½-in. angle 40 ft. long; reduction 11:1.

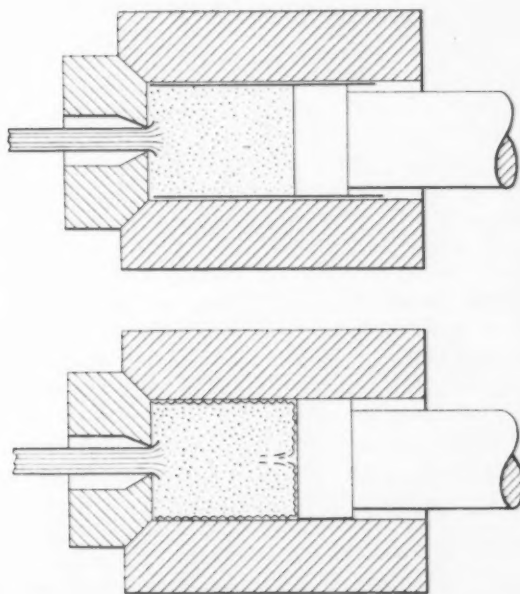


FIG. 5—Influence of follower pad on extrusion. (Above) loose fitting pad shears off oxide skin. (Below) close fitting pad buckles and extrudes oxide.

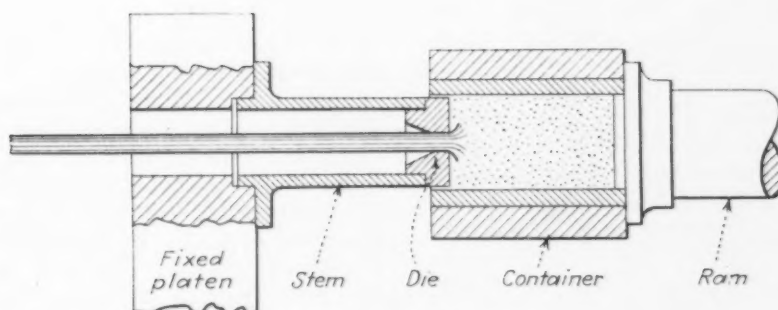


FIG. 6—Inverted extrusion using fixed die and moving container.

at the end of a hollow stem attached rigidly to the front platen. The container is attached to the crosshead and moves in unison with the main ram, being forced over the die for the working stroke. A simpler and more rigid arrangement is possible if a short stroke and short billets are used.

TUBE EXTRUSION: Methods of producing tubes involve the use of some kind of core or mandrel to form the bore, and in the early days of tube extrusion a steel stem was attached rigidly to the front of the follower pad and extending through the hollow billet and die. A stem $2\frac{1}{2}$ in. in diameter working in a circular die of 3-in. diameter would nominally produce a tube 3 in. by $\frac{1}{4}$ in. thick. Billets were cast with a cored hole through the center in which the stem was a loose fit. Obviously while such methods would produce tube blanks for re-drawing, these were far from true or concentric and only heavy walled stock could be extruded. A greater disadvantage was the tendency of the stem to break off where attached to the pad on account of the unbalanced pressure, and while the process was satisfactory for use with lead the higher temperature, pressure and hardness of aluminum limits its use with this metal.

The most usual method employed at present involves the use of a separate plunger and mandrel operating through the center of the main ram and plunger and traveling through the center of the container right up to the die opening. The billet may be cast hollow or bored, or it may be solid in which case the mandrel pierces it through the center and ejects a plug of waste metal. At this stage the main plunger travels forward and forces the finished tube through the die. A concentric product is only possible when all the working parts of the machine are in correct alignment and compensated for wear and temperature changes. With a horizontal press heavy tubes of as much as 12 in. diameter are regularly produced but small diameters and light gages are more accurately formed in a vertical machine. European practice, however, generally favors the use of a powerful horizontal press in conjunction with a series of drawbenches. Tubes with a wall thickness down to $\frac{1}{8}$ in. are formed on the press and subsequently drawn to finished size on the bench.

A British authority with considerable experience in extrusion, A. Wragg, quotes the following degrees of tolerance on tubes produced commercially on a horizontal press. Up to $1\frac{1}{2}$ in. outside diameter, an eccentric-

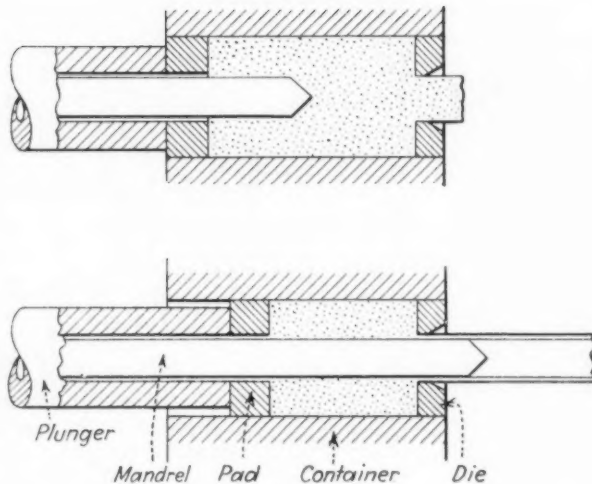


FIG. 7—Tube extrusion by use of mandrel. (Above) mandrel advancing and forming bore of tube. (Below) plunger advancing and forming finished tube over mandrel.

ity of 0.01 in.; up to 2 in., an eccentricity of 0.015 in., and up to 3 in. an eccentricity of 0.02 in. On the overall diameter a tolerance of ± 0.003 in. is usual for tubes up to 3 in. diameter and 0.005 in. for larger diameters. This expert points out that closer tolerances can be obtained at the expense of more supervision and rejections. The above figures give some indication of the minimum practical wall thickness which can be extruded. Another leading English authority, E. Robson, gives 0.040 in. as the minimum wall thickness commercially practicable using a vertical tube press. For lighter gages a drawbench operation will not only give the necessary reduction but will harden and straighten the support.

COMPOUND DIES: Several processes have been patented for producing closed sections without the use of a mandrel, and these methods are applicable to tubes as well as to an unlimited range of box sections. (See Fig. 8.) Briefly, it may be said that while a core or plug cannot be supported in a simple die it can be introduced if the die is in two parts. Thus it is possible for the opening of the first part to be in the form of a "C" in which the core of steel is supported by a tongue of metal at the side. This core is extended beyond the face of the die through a counterpart having a round opening thus forming a capital "O." Under proper temperature and pressure conditions the metal welds together on passing the tongue and emerges as a perfect tube. For many years the principle has been applied to the extrusion of lead covered cables but in the case of aluminum alloys it has been extended and developed to produce a wide range of complicated sections involving script patterns and openings for inserts in the finished section. In some designs the die opening begins as four circular holes equally spaced around the central axis. These

open out and join around a central core having a sharply defined front edge to form the bore of the tube. The outer wall of the tube is formed by a similarly defined flange in the outer die which registers with that on the core. This method of production, while intended mainly for tubes of relatively large size and gage, is claimed to give great accuracy. It is, of course, free from any irregularity due to slight misalignment of the press components, and it is moreover applicable to a simple press without special cylinder and ram for tube pressing.

The foregoing processes indicate the extent to which better die steels and more ingenious die design and tool making are contributing to simplify the press itself. In view of the first cost, cost of operation and maintenance of alignment in a mandrel type of tube press, any method which can be applied to a machine of the simple type has a great advantage economically.

COMPOSITE METAL EXTRUSION: Some interesting studies have been made to define the flow of the metal from the billet out through the die with a view to establishing what part of the block was the first to be extruded and what part followed. Much of this experimental work was done on wax, plasticine and soft metals and the results were not truly representative. Later an English investigator, C. E. Pearson, studied the flow of aluminum alloys by splitting the billet, painting the flat inner surfaces in a checkerboard pattern and afterwards assembling and extruding. The elongation of the black and white portions in the finished rod showed graphically exactly how the cast billet developed when pressed. Others have experimented with billets of two or more different metals with a view to obtaining a composite product of uniform section.

The process of rolling or drawing

composite metal has been known and practiced for many years. For example, the production of copper-clad steel wire involves the rolling and drawing of a composite billet in which the central core is of steel and the outer layer of copper. The final product has a uniform coating of copper from end to end without irregularity. In the case of extrusion, however, the billet is not elongated uniformly in the same way, and if a concentric billet were used in the container the result would be for practically all the core metal to be extruded first. Alternately, experiments have been tried with two short billets

it is necessary to crop off and scrap the first and last portion extruded. While this process is successful for rod and tube production it is not adapted to more complicated sections, especially those having angular contours. In such a case, while the coating metal will lie in a thick layer on the flat portions it will be quite absent on the sharp edges. Another limitation is that the two composite metals should have nearly the same working range of temperature to form a homogeneous product.

EXTRUDED ALLOYS: Extruded light metals come in three classes: (a) alu-

static regulation. An alloy of 20 per cent zinc and 3 per cent copper was extruded experimentally by the late Dr. Rosenhain, using a pressure of 34,000 to 47,000 lb. per sq. in. and a temperature of 700 deg. F. The resulting rods gave a tensile strength of 66,000 lb. per sq. in. and an elongation of 15 per cent. In view of these remarkable properties without heat treatment this alloy was expected to rival duralumin, but it was not adopted commercially because of its high density and low corrosion resistance. An alloy of 9 per cent zinc and 2 per cent copper is however being extruded for use as a screw machine rod and gives 40,000 lb. per sq. in. tensile strength with 15 per cent elongation. The British standard, known as L 32, is in the same class but contains 12 per cent zinc.

A series of normal alloys has been investigated by C. E. Pearson, the British authority. These were mainly of the aluminum-copper group containing from 1½ to 5 per cent copper.

With an extrusion temperature of 660 deg. F. and a pressure of 29,000 to 33,000 lb. per sq. in., the finished rods gave a tensile strength of 26,000 to 29,000 lb. per sq. in. with 11 and 6 per cent elongation respectively, depending on the percentage of copper. The tests were made principally to establish a relation between operating temperature and pressure; the hotter the billet the lower the working pressure in the container. The limits of temperature are, however, not wide enough in the case of alloys to take full advantage of this law. Pearson's experiments were made on a small inverted type of press and cannot be compared with the conditions of direct extrusion.

Heat-treated alloys of the Duralu-
(CONCLUDED ON PAGE 92)

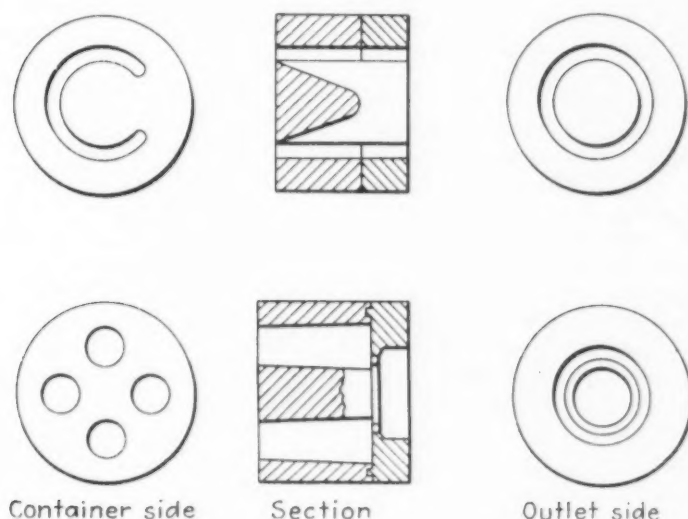


FIG. 8—Compound dies for tube extrusion. (Above) elementary form. (Below) patented design.

of different metal charged into the container end to end. In this case the finished rod would show first one then the other and lastly the first metal predominating in the product.

To secure a reasonably uniform composite rod, wire or tube, the ingot or billet must be proportioned in a special way so that the central or core metal forms a perfect cone surrounded by the outer or coating metal. (See Fig. 9.) This ingenious method is patented and is coming into extensive practical use. It is often desirable for a light alloy tube to be lined or covered with a layer of high purity aluminum a few thousandths thick to act as a corrosion resisting skin.

In such a case the ingot would be poured with the alloy forming the central cone and the pure metal the surrounding material to fill the mold. The proportions of the two metals will determine the thickness of the layers so that either a thin lining or a thin covering can be produced on the tube. To obtain a reasonably uniform product

minimum 99 per cent pure; (b) normal alloys; and (c) heat treated alloys. The first mentioned is important commercially in the shape of architectural and auto body moldings, tubes and a wide range of sections which do not call for mechanical strength. The tensile strength averages 11,000 lb. per sq. in. and the elongation is 20 per cent; this high degree of ductility makes it possible to form or shape the sections after extrusion. For example, extruded flat busbars for switchboards can be bent edgewise; tubes can be coiled around a short radius and moldings can be shaped to conform to the curves of motor coach bodies. In the engineering sense, however, pure aluminum extrusions are unimportant.

Normal alloys of aluminum-copper, aluminum-zinc and aluminum-silicon are extruded commercially, giving a product some three or four times stronger than pure metal. Higher pressures are called for and closer control of working temperature by means of a heated container with thermo-

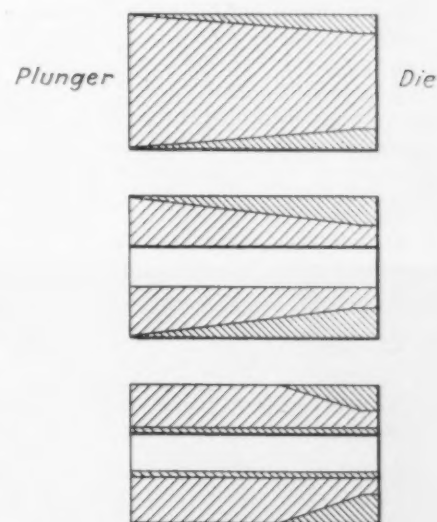


FIG. 9—Composite billets for extruding coated rod and tube.

Aircraft Cable Applications

MANY thousands of feet of cable enter into the assembly of Douglas transport and military planes, a large proportion of it being of the preformed type which does not fray out when cut and which can be run over pulleys or sheaves of smaller diameter than the type which is not preformed. A great deal of the cable used is made from stainless steel wire because of the safety factor inherent in its resistance to corrosion.

To the casual observer, cables and the methods by which they are fastened to other parts may appear like minor details, but they are far from being taken for granted in aircraft manufacture. At the Douglas plant in Santa Monica, Cal., an entire department is given over to the preparation of lengths of cable and the application to them of various fittings. Several different methods of attaching fittings are employed and all cables used in flight control are subjected to test under loads much beyond those they must carry in service, to make sure that the cable itself as well as the fittings attached to it will not fail in service.

All cables for flight control must have fittings attached by swaging or by splicing and without the application of heat. Swaging is done in a standard swaging machine, with the sleeve portion of the clevis or other fitting held in a suitable die, the cable, of course, being inside the sleeve. The series of blows applied in the hammer-like action of swaging cause the metal of the fitting to flow into the spaces

between the individual wires of the cable, making the fitting, in effect, virtually one piece with the cable. No solder or other foreign substance is applied in this operation and no heating is needed. In an average case, the fitting can be slipped over the cable, adjusted as to position in the swaging machine and the swaging done at the rate of about one fitting a minute. The machine has a hollow spindle through which the cable extends and through which also the cable, with the fitting attached, can be withdrawn after the swaging is completed. The fastening is so secure that the cable itself will break under a pull much less than that which would be required to separate the cable from the fitting.

Splicing over thimbles is done in a jig which holds the parts in correct relative position, and follows a well standardized procedure. It is done by hand, but with the use of pliers and other hand tools and involves an interlacing of the separated cable strands with those forming part of the cable itself where the strands are not separated except to provide openings through which the strand ends are threaded. Again, no solder is applied in the case of flight control cables but, after the wire ends are cut off close, the splice is often covered with tape or wound with cord to afford a smooth surface. Some cables not used for flight control have splices soldered, the solder being applied from a ladle and touched up with an electric soldering iron to make sure that the

solder penetrates between strands as required.

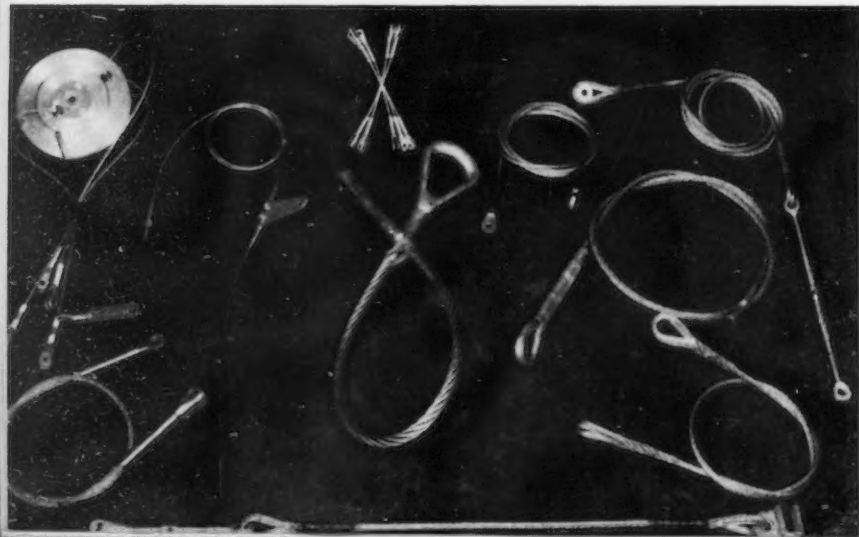
In many cases where fittings are to be applied by sweating, the cable is supplied with the steel wires tinned. After the cable has been cut to length, the clevis or other fitting is slipped over the cable end and, if the sleeve be open at the outer end, the ends of cable wire are slightly spread or turned over. Then the cable end and fitting are dipped in molten solder once or twice to make sure that the solder runs in where required, after which the assembly is wet to set the solder. This operation, though simply described, requires considerable skill to insure a good joint and is done, of course, by workmen who have acquired the necessary skill through long experience.

Stops are sometimes required on cables at points between the ends and these also are applied by soldering. The clip or stop is ready tinned and, when in correct position, soldering paste is worked in and solder then applied by the use of an electric iron.

Before cables have fittings attached they are usually cut to required lengths on benches provided for this purpose, many of the lengths being 25 ft. or more and others shorter, down to a few inches long. In some cases, it is necessary to thread the cables through sheave holes before the fittings are attached.

All cable assemblies are given, of course, a rigid visual inspection and those involved in flight control are proof tested. This is done by attaching the fitting at one end to the short vertical arm of a bell-crank, the long horizontal arm of which carries a weight of required size. The other end of the cable is then attached to a small hydraulic jack arranged on a track to which it can be clamped when adjusted. When ready to receive the load, the jack is used to apply the required pull, which is that necessary to raise the weight on the horizontal arm of the bell crank. Naturally, the pull, which may be two or three times that the cable will be subjected to in service, is applied to the end fittings as well as to the cable. The test affords assurance that the joints between the cable and the fittings have been properly made.

The accompanying illustration shows several of the shorter lengths of cable and the various types of fittings applied by each of the methods described above. Naturally, many much longer lengths of cable than are shown and various other shapes and sizes of fittings are included among those handled for different purposes and different types of craft.



A FEW of the numerous sizes and lengths of flexible cable and some of the fittings applied to them, by methods outlined in the text, in the Douglas Aircraft plant, Santa Monica, Cal.

Industrial Controlled Atmospheres

By NORBERT K. KOEBEL

HEREIN, in the third section of a four-part article, the author describes nitrogen generators and nitrogen atmospheres, and double cracked gas for heat treating high carbon and tool steels decarburization-free, bright or scale-free. In previous issues attention was directed to efficiency of controlled atmospheres, the air-gas ratio method, pack hardening, atmospheres produced by carbonaceous muffle blocks, cracking liquid hydrocarbons, etc.

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THE recent developments in controlled atmosphere methods proposed for heat treating high carbon and tool steels bright or scale-free and free from decarburization or carburization are as follows:

- (1) Chemical purification generators.
- (2) Nitrogen generators.
- (3) Endothermic reaction generators.

(4) Charcoal gas generators or charcoal gas mixed with other gases.

(5) Specially designed furnace for using cracked anhydrous ammonia.

Chemical Purification

In order to produce an atmosphere which could be used to heat treat high carbon and alloy steels scale-free and decarburization-free, some industrial furnace and atmosphere manufacturers decided to eliminate the remaining undesirables, CO_2 , H_2S , and H_2O by chemical purification and drying.

The flow sheet for this process can be seen in Fig. 17. This method and equipment for removing the CO_2 and the H_2S consist of a closed and automatic system of scrubbing towers in which the CO_2 laden gas is bubbled or passed through a spray of the chemical absorbent, which is usually one of the ethanolamines or a related chemical of that series. By this process all the H_2S and practically all but a light trace of CO_2 is effectively removed. The CO_2 , H_2S free gas then passes through a surface cooler where the excess water vapor is condensed and separated out. The partially dried gas is finally passed through an activated alumina drying equipment and is dried down to a dew point of -50 deg. to -60 deg. C., practically bone dry. The

processed gas is now ready to enter the furnace chamber.

The CO_2 laden absorber from the scrubbing tower passes automatically into another tower having an electrically or gas heated chamber for distilling off the CO_2 and any H_2S . The CO_2 , H_2S , and steam from this distillation process passes through a reflux condenser in which the CO_2 and H_2S are separated from the water. This water is returned to the system after the hot and somewhat concentrated CO_2 and H_2S -free ethanolamine solution is passed through a heat exchanger and cooler. The ethanolamine is then passed back through the scrubbing tower to complete the cycle. Thus, by this method the chemical absorbent is kept at the proper concentration and is used over and over with only a slight addition of the chemical from time to time for make-up of losses. The activated alumina dryer is regenerated from time to time by heating the chamber with either electric or gas and blowing air through the activated alumina to drive off the moisture or steam. In some cases the air is heated by the heat from the combustion chamber, thus supplying hot air to regenerate the dryer and also controlling the temperature of the combustion chamber at the same time. While this

regeneration process is being carried out a second activated alumina chamber is used for drying the gas from the CO₂ removing equipment to make the process continuous.

The resulting gas from the above equipment will contain H₂, CO, CH₄, N₂, and possibly a trace (0.05 to 0.10 per cent) of CO₂. The amount of H₂ and CO depend upon the air-gas ratio on the combustion equipment. By referring back to Fig. 10, it is apparent that a great variety of gas compositions containing CO, H₂, CH₄, and N₂ can be obtained. However, from both laboratory experiments and practical experience from industrial furnaces it is best to control the combustion so as to have a gas resulting in as high a CO composition as possible and also to end up with about 1.0 to 2.0 per cent CH₄. The small amount of CH₄ is needed to balance out the decarburizing properties of the H₂ and also keep the atmosphere in balance as small traces of air filter into the furnace to react with the H₂ to form H₂O and with the CO to form CO₂. Also, from Fig. 10 it is apparent that the resulting gas will always be higher in H₂ than CO; thus to raise the CO as much as possible and obtain the right amount of CH₄ so that the resulting processed gas is neither carburizing or decarburizing, the range of air-gas ratios becomes quite limited. It is also desirable to keep the CO₂ down as much as possible so as not to overtax the CO₂ removing equipment and thus obtain better efficiency and less danger of traces of CO₂ in the resulting purified gas. The above equipment is adjusted so as to produce a purified and dried atmosphere of the following composition: 20 to 25 per cent H₂, 10 to 15 CO, 0.75 to 3.0 CH₄, balance N₂.

Fig. 18 shows the results obtained by testing high carbon steel samples in an industrial furnace employing a chemically purified atmosphere. The tests to obtain the curve at 1750 deg. F., 250 deg. F. higher than necessary for the steel to be treated, were purposely made to determine the stability of the atmosphere, i.e., whether the various gases of the atmosphere react with each other at various furnace temperatures to produce an undesirable atmosphere, and also to be able to predict the tendency of the atmosphere towards decarburization or carburization.

The results obtained on both sets of samples are not only excellent, but are also perfect. The advantages of chemical purification can readily be seen from these results noting that the

elevated temperature curve practically coincides with the lower temperature curve showing the atmosphere's tendency to remain neutral and showing indirectly its stability.

This atmosphere can be produced quite reasonably at a cost of about 55 to 75c. per thousand cubic feet depending upon the cost of the raw gas and the design and efficiency of the unit. The only serious disadvantage of this atmosphere is the initial cost of the equipment to produce it. The smallest unit that can be obtained produces about 200-400 cu. ft. per hour and costs from \$3,000 to \$5,000 depending on the design and manufacturer.

One can imagine the difficulty an industrial furnace manufacturer would have in selling a continuous production furnace or a tool room furnace employing atmosphere equipment costing as much or twice as much as the furnace itself. Because of this disadvantage only a few installations are now in use, and these are on very special applications. Within the last year great strides have been made in the development of low cost equipment to produce atmospheres low in CO₂ for high carbon and tool and alloy steels, and thus the method of chemical purification by scrubbing out the CO₂ has practically been abandoned unless it has to be chosen for a very special application where the optimum atmosphere conditions are required.

Nitrogen Atmospheres

One of the first lessons taught by elementary chemistry is that certain elements and gases like nitrogen, neon, argon, helium, etc., are inert and do not react with other substances. With this idea in mind coupled with the results obtained from laboratory tests, almost all who have had anything to do with heat treating conceived the idea that nitrogen would be the ideal heat treating atmosphere. Because of the high cost of reclaiming nitrogen from air and selling it in bottled containers, this gas has had very little use or application in commercial heat treating and has been confined chiefly to the laboratory experiments.

With the above views in mind, several manufacturers have developed and perfected a very ingenious method of producing nitrogen at a low cost with a purity from 99.0 to 99.85 per cent. In principle this method is identical with the one already described under the heading of "chemical purification," and the same explanation and flow sheet, Fig. 17, will therefore apply to this method. The only difference in operation is that the air-gas ratio on

the combustion unit is set so that practically perfect combustion is obtained (see Fig. 10) and the only products resulting are CO₂, N₂, and H₂O. The CO₂ is scrubbed out by an ethanalamine, and the excess moisture is condensed out and the gas finally dried by the use of activated alumina dryers leaving practically pure N₂. The resulting gas usually analyzes from 99.0 to 99.85 per cent N₂, 0.05 to 0.030 CO₂, 0.10 to 0.90 CO, 0.00 to 0.05 O₂, depending upon the setting of the air-gas ratio and the efficiency of the CO₂ removing equipment. Usually an attempt is made to keep the air-gas ratio set so as to produce a fractional per cent of CO in order to prevent any fractional percentage of O₂ in case the gas conditions should happen to fluctuate abnormally. If desired, however, the above equipment can be operated to produce a gas of a composition of 90 per cent N₂, 5 CO₂, 5 H₂ or any other composition with increasing amounts of H₂ and CO.

The chief difference between this equipment and the other explained under the heading of "chemical purification" is the design of the combustion unit to obtain precision results on perfect combustion and on the design of the CO₂ remover to handle the increased volume of CO₂ effectively and efficiently. This has been accomplished very effectively, and all credit must go to the engineering skill that has been put into the design of this equipment.

Fig. 19 shows the results obtained on the high carbon steel strip samples heat treated in a commercial furnace of the muffle type employing an atmosphere from a commercial nitrogen generator. From these results it can be seen that this type of atmosphere is far from being neutral and is too decarburizing for thin springs of 0.005 in. to 0.050 in. stock if such were allowed to or had to remain in the furnace for a period of over 10 min. The elevated temperature test on this steel shows that the decarburizing properties of this atmosphere are magnified, and even worse decarburization might be expected from this atmosphere on high carbon tool and alloy steels. The above samples heat treated in atmosphere "A" were quenched directly into oil, through a chute, without contacting the air. These samples were scale-free but were stained or temper colored.

In explanation of the decarburizing properties of atmosphere "A" of Fig. 19, the section on the theory of a good atmosphere and the effects of impurities, in the previous section of this

article should be referred to. In this section the effects of a CO_2 impurity in an atmosphere were discussed and illustrated by curves. It should also be noted that the $\frac{\text{CO}_2}{\text{CO}}$ ratio of atmosphere "A" in Fig. 19 is $\frac{0.3}{0.9}$ or $1/3$ or 0.333. By referring to Stansel's curves, Fig. 15, it will be noted that at 1500 deg. F. such a ratio is decar-

not. The results of this test can also be seen in Fig. 19, referring to the curve of atmosphere B. This atmosphere was even more decarburizing than the one with less CO. The samples were also stained and temper colored.

Although the $\frac{\text{CO}_2}{\text{CO}}$ ratio has been greatly decreased in atmosphere B, another decarburizing combination of

these curves have very little use in predicting the results of a protective atmosphere since most atmospheres are complex mixtures of various gases.

In order to serve as a check on the above results obtained from a nitrogen atmosphere, a set of tool steel samples were heat treated in the same commercial, muffle-type furnace using an atmosphere with as high a purity in N_2 that could be obtained within the

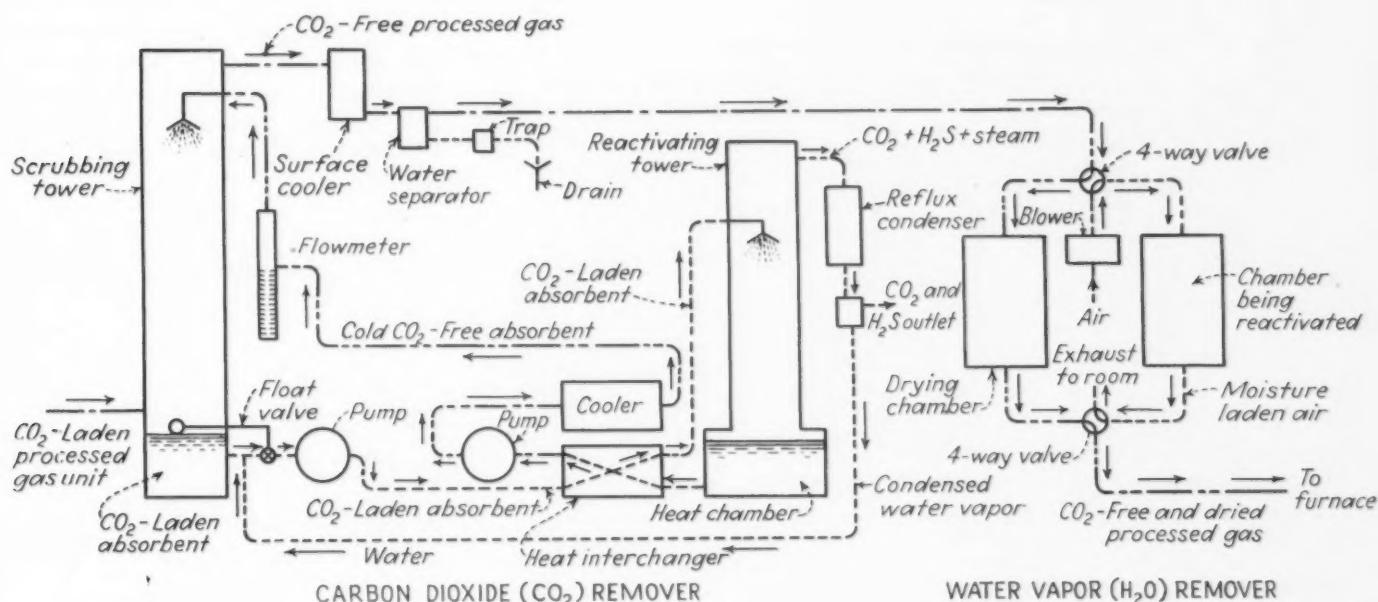


FIG. 17—Flow sheet of the chemical purification of a controlled atmosphere.

burizing to steel. This brings up another important point which is often overlooked when considering atmosphere; the $\frac{\text{CO}_2}{\text{CO}}$ ratio is what really counts and not the percentage of the constituents in the CO_2 -CO, or CO_2 -CO- N_2 atmosphere. The high percentage of nitrogen would tend to slow such a reaction down by dilution, but the equilibria would not be changed. From the above consideration and analysis of atmosphere A, the decarburizing tendency of such an atmosphere might be predicted, but the magnitude of its effects would have never been predicted or guessed to be so great without the aid of actual test data.

An attempt was made to eliminate the undesirable decarburization and temper marks by adjusting the air-gas ratio on the generator unit so as to put the atmosphere slightly on the reducing side by obtaining 5.0 per cent CO and, of course, by nature of the combustion in this range an equal amount of H_2 whether it is wanted or

gases has entered to offset the attempt to make the atmosphere neutral. This combination, CO_2 - H_2 -CO, was explained and illustrated by the curves in an earlier section. Therefore, since a third active element has entered, Stansel's curves can no longer be used to explain the decarburizing properties because the data for the $\frac{\text{CO}_2}{\text{CO}}$ ratios were obtained by these two gases alone and with no other active gas present. Likewise, the action of the $\frac{\text{H}_2\text{O}}{\text{H}_2}$, and the $\frac{\text{CH}_4}{\text{H}_4}$ ratios were each separately determined on steel samples saturated with carbon at the temperature in question.

An attempt was made to explain the decarburizing properties of atmosphere A and B of Fig. 19 by the use of Stansel's curves in order to show where this theory may and may not be applied. In general it can be said that

ultimate working range of the generator equipment. The results in Fig. 20 show that this atmosphere is decarburizing to all the tool steel samples, and an inspection of the Rockwell hardness reading and the photomicrograph of Fig. 21 show that tools heat treated in this type of atmosphere would have to be ground to remove the soft skin, thus defeating the chief purpose of a good tool steel atmosphere—to heat treat absolutely decarburization-free and scale-free. All of these samples, like the strip, high carbon samples, were quenched without contacting the air. Likewise, all samples were scale-free but light stains of oxide and temper marks prevailed.

From the above results it can be seen that small traces of impurities in nitrogen can be and are even more decarburizing than air. The cost of removing such small percentages and traces of impurities on a commercial scale would be too prohibitive, if not impossible, to the cost of the gas and to the added initial cost of the equipment. Even though nitrogen of a 100

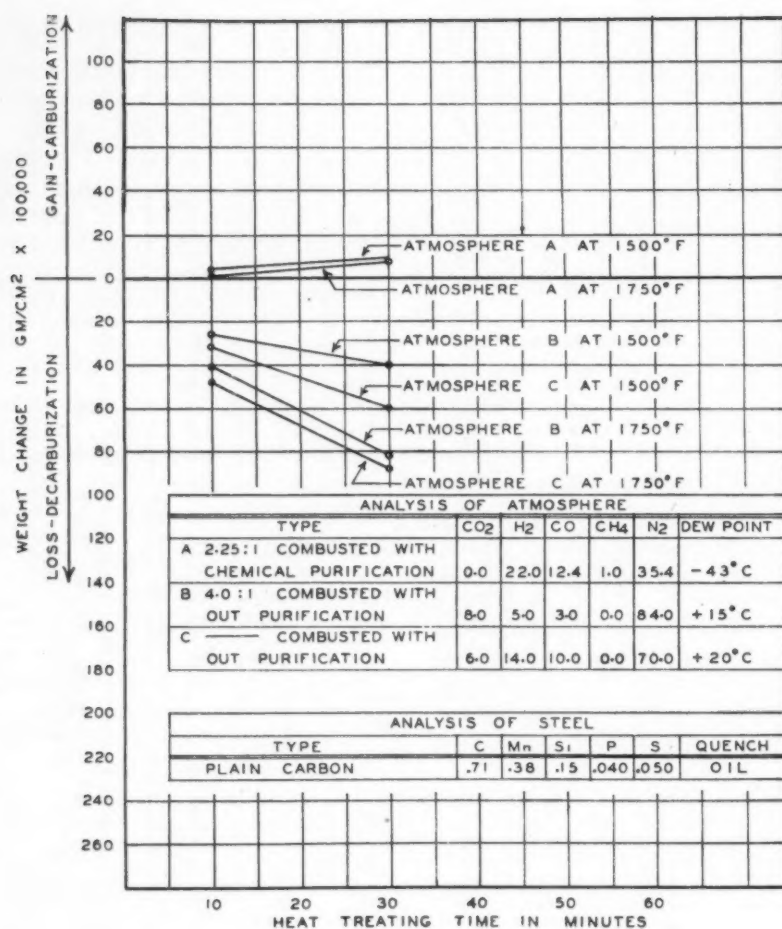


FIG. 18—Results of hardening a high carbon steel (0.71 per cent C) in a chemically purified and an unpurified generator gas.

per cent purity could be obtained, it would be impossible to keep this purity in a commercial heat treating furnace with air filtering in through the door, etc. This reason alone is enough to discourage the use of a nitrogen atmosphere. Experience gained from the application of atmospheres to commercial, atmosphere furnaces indicate that the higher the CO content, the better are the results from the point of view of non-decarburization and brightness. The above commercial nitrogen atmosphere could be, however, doctored up so as not to be decarburizing by adding from 5 to 10 per cent methane, natural gas, propane, benzol, or any other hydrocarbon, but this would be defeating the purpose of the costly atmosphere generator. The best method of operation would be to set the air-gas ratio to obtain an atmosphere of 20 per cent H₂, 14 CO, 1.0

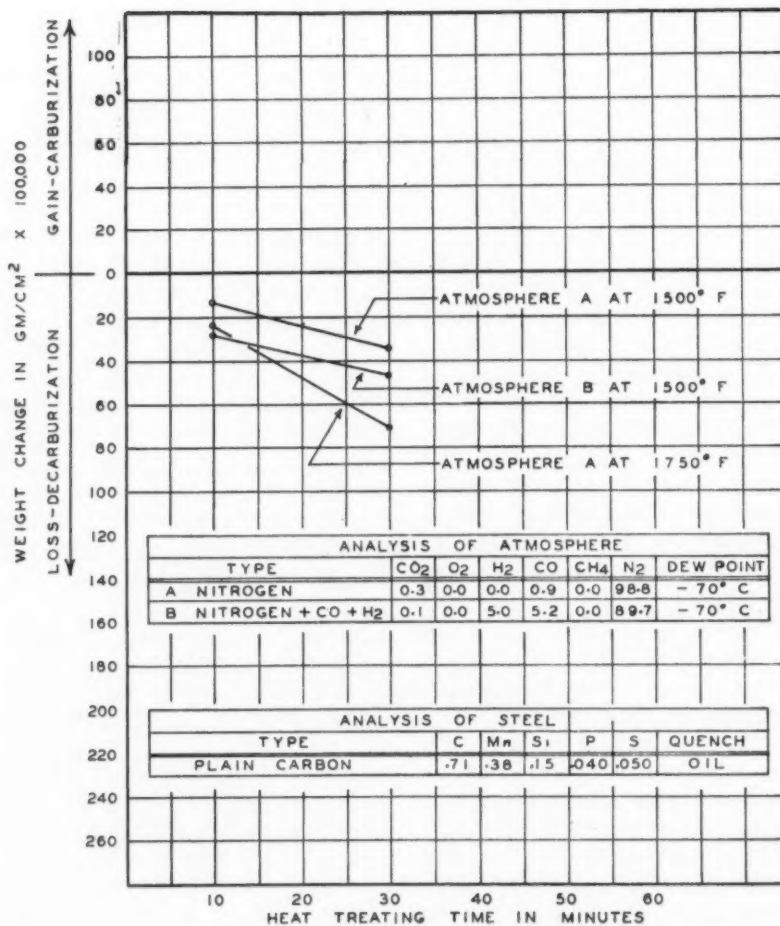
CH₄, balance N₂, the same as explained under the heading of chemical purification.

The only application that the above equipment operated as a nitrogen generator would have in the line of heat treating atmospheres would be to supply nitrogen as a diluent for natural gas for carburizing. This is, indeed, an excellent and cheap method of diluting natural gas, propane, or any other hydrocarbon to prevent it from depositing too much soot and to be able to control the case. The cost of nitrogen of 99.8 per cent purity from this generator is from 35 to 55c. per 1000 cu. ft., including the cost of raw gas, chemicals, and cost of operation, as compared to bottled nitrogen at \$20 per 1000 cu. ft. having the same degree of purity.

The initial cost of a nitrogen generator, depending on the manufacturer,

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FIG. 19—Results of hardening a straight, high carbon steel (0.71 per cent C) in a generator nitrogen atmosphere.



runs from \$4,000 to \$5,500 for producing from 300 to 500 cu. ft. of nitrogen per hr., about the smallest unit that can be obtained. Larger units of a 1000 cu. ft. per hr. capacity cost about \$7,000, while one of a 2000 cu. ft. per hr. would run about \$11,000.

In consideration of the initial cost, this unit operated to produce the same type of atmosphere like the one described under chemical purification would be too great for a single small continuous production furnace or tool room furnaces inasmuch as equipment to produce the desired results can be obtained at a lower initial cost. However, some very special applications or large production units may warrant the high initial cost. In the case of carburizing atmospheres, the initial cost of this equipment could be justified to produce nitrogen at a low cost for diluting natural gas whenever such is used to a great extent for carburizing.

Endothermic Reaction Generators

In order to produce an inexpensive gas low in CO₂ without the use of chemical scrubbing and purification, several furnace and atmosphere manufacturers have developed a method for double cracking city, mixed, or natural gas for heat treating high carbon and alloy steels decarburization-free and scale-free. In principle this method consists of first, cracking the CH₄ component of the raw gas into H₂ and CO, and, second, forcing the H₂ and the CO₂ constituents of the resulting gas to react with each other endothermically by means of heat supplied from electrical energy to produce H₂O and CO, as described by the interreaction of gases and illustrated by Fig. 13.

The equipment and method for producing such an atmosphere consists of a primary cracking unit of the standard type for measuring and mixing the raw gas with air for partial combustion and cracking. This unit like others already described is heated to 1400-1800 deg. F. by the process of the combustion of the air-gas mixtures, and the temperature is controlled by means of a water jacket around the combustion chamber or by air supplied by means of natural draft vents. The air-gas ratio is adjusted accordingly to the type of gas being burnt so as to produce a resulting gas of 3 to 5 per cent CO₂, 20 to 25 H₂, 10 to 16 CO, 2 to 4 CH₄, 5 to 15 H₂O and balance N₂.

In the next step, the above gas is passed through a surface cooler to condense and separate out the excess moisture. The H₂O content of the gas after this operation will depend upon the temperature of the cooling water supplied to the surface condenser. Usually the efficiency of a surface condenser of the type where the gas is passed through coils surrounded by water is such that the dew point of the gas will be about 10 deg. F. higher

this case, to a water vapor content of 0.800 per cent.

The gas is now ready to be passed through the secondary cracking unit which is electrically heated to 1850 to 1900 deg. F. The reaction taking place in this unit is as follows:



The importance of dehydrating the gas before it was passed into the secondary cracking unit can be seen by

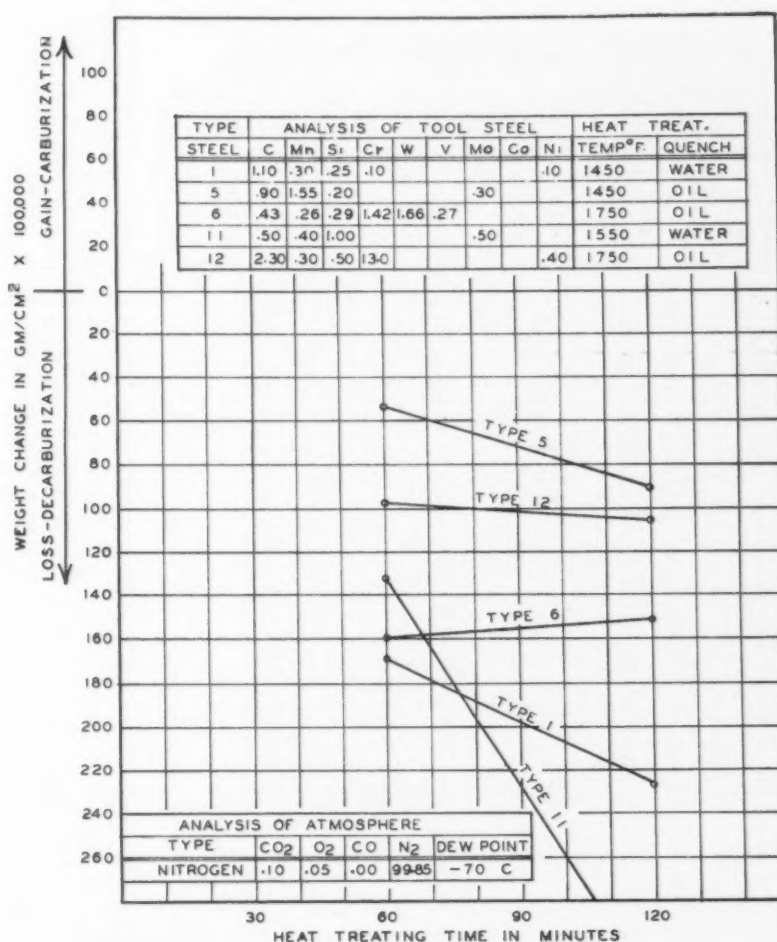


FIG. 20—Results of hardening tool steels in a generator nitrogen atmosphere.

than the temperature of the cooling water. For example, if the temperature of the water is 60 deg. F., the dew point of the gas will be 70 deg. F., which is equivalent to 2.44 per cent H₂O.

In most cases the gas is dehydrated still further by passing it through a refrigerating unit. Such a unit usually operates at a temperature of 40 deg. F., delivering a gas with a corresponding dew point equivalent in

the above reaction. If the gas had a high H₂O content, equilibrium would be reached and the reaction would stop, thus resulting in only a partial conversion of the CO₂ to CO. The efficiency of the above reaction in reducing the CO₂ content depends, therefore, upon keeping the H₂O content as low as possible to begin with so as to force the reaction to the right.

After the secondary cracking, the gas is finally passed through an acti-

vated alumina dryer to remove the H_2O formed in the reaction and to produce a gas with a very low dew point.

The results obtained on samples heat treated in a commercial atmosphere furnace employing an atmosphere produced by a commercial generator of this type can be seen by referring to atmosphere A of Fig. 22. These curves show that practically perfect results can be obtained from such an atmosphere when used for

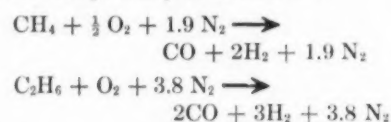
large production units where this type of atmosphere is needed may be justified. The cost of a unit to produce about 250 to 400 cu. ft. per hr. runs from \$4,000 to \$5,000.

In many cases the heat treating requirements and specifications on production jobs employing an intermediate, high carbon, or alloy steel are such that scale-free and practically decarburization-free, but not perfect, results are required. In these cases a controlled atmosphere user feels that the

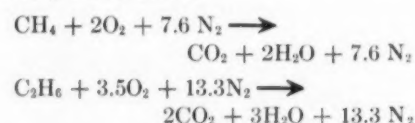
cracking chamber electrically heated and packed with a special catalyst to obtain the desired reaction, a thermocouple and pyrometer for controlling the temperature of the cracking chamber, and a surface condenser and water separator for removing the excess moisture.

In operation a ratio of air to gas is measured and thoroughly mixed by the positive displacement pump as it is passed into the cracking or combustion chamber. The reactions occurring in the front end of this chamber are principally the same as occur in the primary combustion chambers of other types of generators. The O_2 of the air reacts with the CH_4 and the C_2H_6 constituents of the gas to crack them down to CO and H_2 as a primary or principal reaction and to CO_2 and H_2O as a secondary or side reaction. If CO and H_2 are present in the raw gas as in the case of city, mixed, or coke oven gases, the O_2 of the air will also react with the CO to produce CO_2 and with the H_2 to produce H_2O as a primary reaction. As these cracked or combusted constituents pass over the catalyst at 1850 to 1900 deg. F. in the electric heated chamber, the reaction of CO_2 with H_2 occurs to produce CO and H_2O , thus reducing the CO_2 content and raising the H_2O content.

The amount of H_2O and CO_2 present in the final gas will depend upon the type of raw gas used and, of course, the ratio setting. For example, if a natural gas of a composition say 67.6 per cent CH_4 , 31.3 C_2H_6 , and 1.1 N_2 is passed through this type of generator with about a ratio of one part of gas to 4 or 6 parts of air, the reactions in the cracking chamber can be controlled by means of the temperature and catalyst so that the greatest percentage of the cracked gases comes from the primary reactions of:



and only a very small percentage of the constituents comes from the secondary reactions of



Thus, by using a natural gas and cracking it in this type of generator, it is possible to obtain a dew point as low as -13 deg. C. ($0.17 H_2O$) to

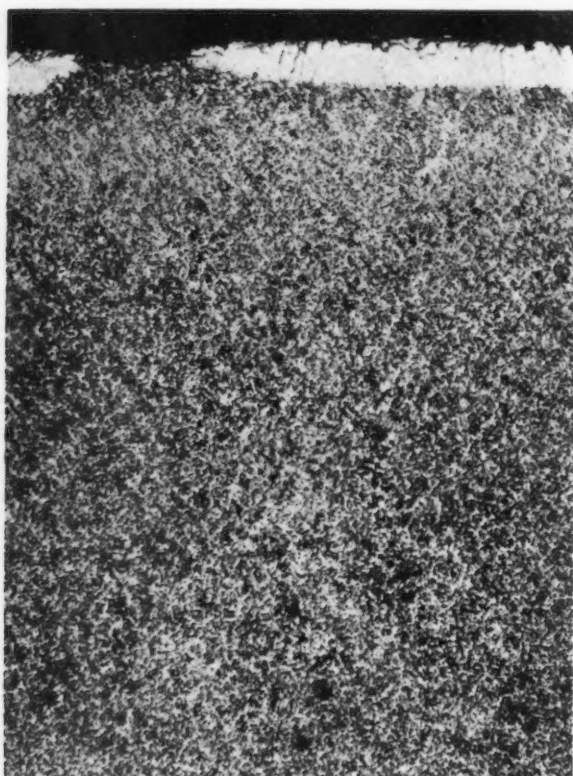


FIG. 21 — This shows the decarburization on the 60-min. sample of Type I, straight carbon tool steel of Fig. 20. Magnification 100 diameters. Nital etchant. Drawn to 700 deg. F., Rockwell hardness as quenched 41-48C.

heat treating thin, spring parts made of a 0.70 per cent C steel.

The accelerated test at 1750 deg. F. on this steel shows the stability of the atmosphere and its tendency to remain neutral; from this test such an atmosphere could be expected to be neutral to this steel and other carbon and alloy steels for a longer period of heat treatment. All the samples of the above tests remained bright after heat treatment.

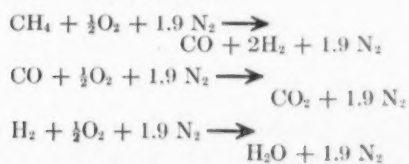
The above atmosphere can be produced for about 50c. per 1000 cu. ft. depending on the cost of the raw gas. The initial cost of the above equipment is still far too high for an atmosphere generator for a tool room furnace and even for a small or medium size continuous hardening furnace. Its use on

complete refinement of a gas is not necessary and does not wish to make an investment in high priced equipment. To meet such cases and demands another type of endothermic reaction generator has been developed and placed on the market recently to sell at a much lower initial cost than the type explained above. This low priced generator was designed to operate without the aid of refrigerating dehydrators or activated alumina driers to produce a gas rather low in H_2O , low in CO_2 and high in H_2 and CO .

The equipment for producing such an atmosphere consists principally of flow meters for measuring the gas and air, a positive displacement pump for mixing these gases, a combustion or

0 deg. C. (0.60 per cent H₂O) without the use of refrigeration or driers, and a resulting analysis of 1 to 1.5 per cent CO₂, 17 to 20 CO, 30 to 35 H₂, 0.5 to 1.5 CH₄, and balance N₂.

On the other hand if a city gas of an analysis of 3.5 per cent CO₂, 14.5 CO, 44.3 H₂, 27.6 CH₄, 9.5 N₂ were passed through this type of generator, the primary reactions with the supplied air ratio would be:



It can be seen that in this case because of the high percentage of the H₂ in the raw gas, a higher percentage of H₂O in the finished gas could be expected than in the case of cracking natural gas. In this case the H₂ will also react with a higher percentage of CO₂ to form a larger percentage of H₂O and CO than in the case of the natural gas. Thus the excess H₂O would be large enough to condense out in the surface condenser, and a gas of a dew point of 70 deg. F. (2.44 per cent H₂O) would be expected if a cooling water of 60 deg. F. were used in the condenser.

It can be readily seen that this type of generator is not as fool-proof for adapting any type of raw gas as is the other type of endothermic reaction generator equipped with driers, but it has the advantage of a lower initial cost and can be used very successfully on certain applications for heat treating medium or high carbon steels, especially if natural gas is available for conversion.

Results of samples heat treated in an atmosphere produced in such a generator by cracking natural gas can be seen by referring to the curves of atmosphere B in Fig. 22.

These curves show that the 0.71 per cent C thin, spring steel can be heat

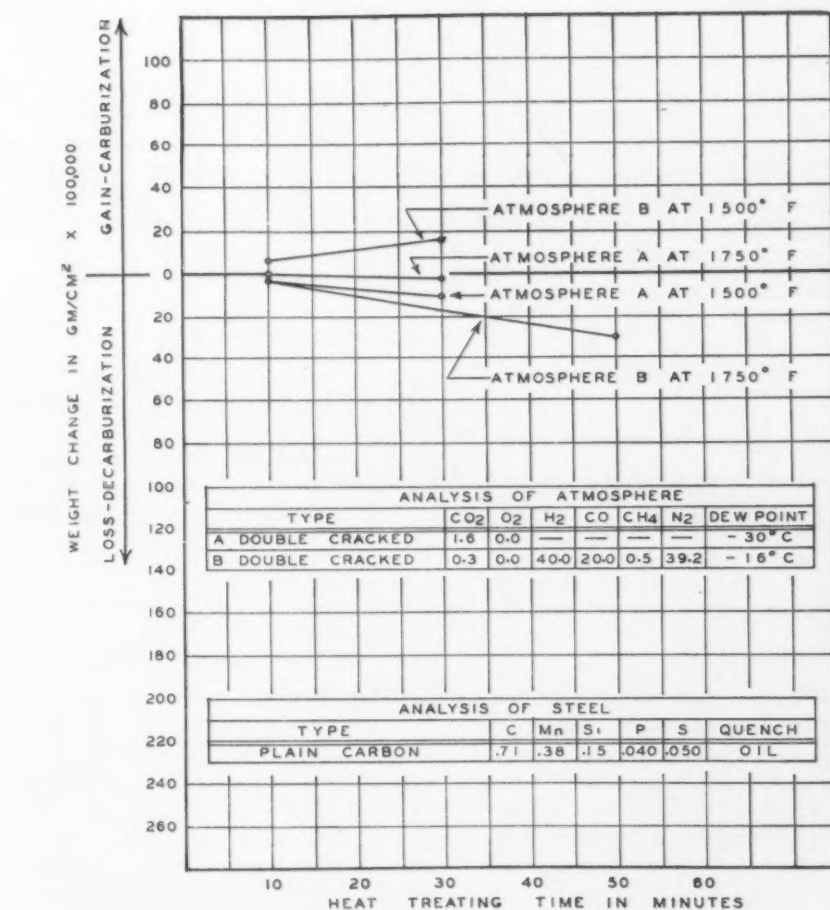


FIG. 22—Results of hardening a straight, high carbon steel in several endothermic reaction types of atmospheres.

treated without decarburization on short periods of heat treatment normally applied for hardening such stock. The elevated temperature test shows that this gas produced without drying with a dew point of -16 deg. C. is only slightly less stable and more reactive than atmosphere A dried by activated alumina driers to a dew point of -40 deg. C. The samples of atmosphere "B" were quenched without contracting the air and remained bright.

Such a generator will produce an

inexpensive gas at a cost ranging from 20c. to not more than 50c. per 1000 cu. ft., depending on the cost and type of raw gas used. The initial cost of the equipment for 250 cu. ft. per hr. rating will run about \$1,250.

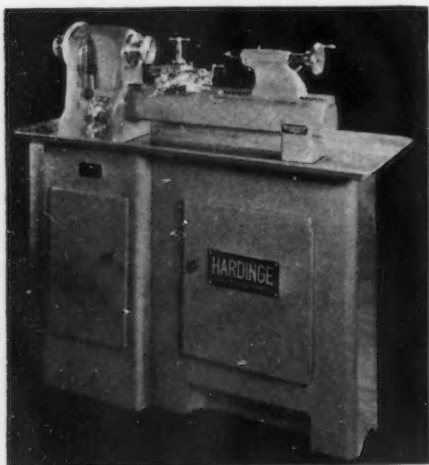
Ed. Note:—Next week the author concludes this informative article with data on charcoal generator gas, hydrogen and hydrogen-nitrogen atmospheres, etc.

New Equipment ♦ ♦ ♦ ♦

Machine Tool Review:

High precision and light production lathes, tool grinders, vertical and horizontal millers, gear cutting equipment, etc., are continuously being improved. Here we show some of the most recent additions to the field.

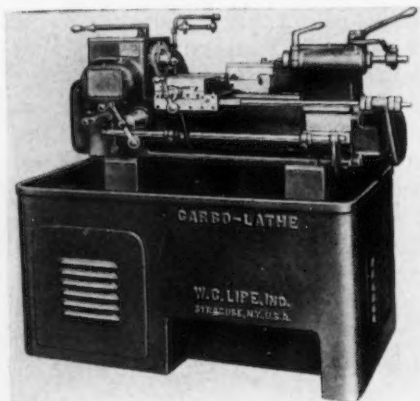
THE new high-speed precision lathe announced by Hardinge Bros., Inc., Elmira, N. Y., represents a complete refinement of all similar previous machines and incorporates such features as enclosed head with preloaded ball bearing spindle and an electrical driving unit with multispeed motor which eliminates gears, clutches and loose pulleys. Lathe is offered in five sizes up to 1 in. collet capacity and 9 in. swing. Driving unit provides eight forward and eight reverse speeds ranging from 230 to 3900 r.p.m. Bed of machine rests on three spheres to guard against any distortion which might result from an uneven floor. Headstock bearings are fully enclosed in an inner chamber. Rear of spindle carries a double V-pulley for two endless belts. Collet draw spindle has a ball bearing section to absorb thrust. Tailstock design is such that the spindle, regardless of position, never loses its full bearing and has a precision ball thrust bearing.



Two levers at the headstock end control low, stop, high and forward, brake, stop and reverse spindle movement. Brake adjustment may be readily made without removing any part of machine or driving unit. Collet board is mounted on the door to provide storage space for collets and lathe centers.

Box Type Production Lathe

DESIGNED for high production turning with alloy tools, the Lipe Carbo-Lathe is now offered by

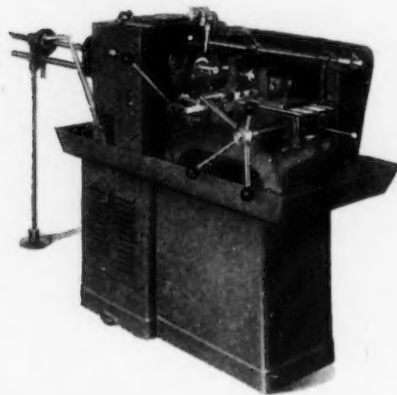


W. C. Lipe, Inc., Syracuse, N. Y., with improvements which add to its rigidity and increase its ability to take heavy precise cuts in tough material. The base is a box section, completely enclosing the motor and drive mechanism. Base also houses a larger coolant tank and chip pan. Power from the motor is applied through a worm drive. Ball and roller bearings are used throughout. Lathe has a 12 in. swing and is 18 in. between centers.

Tailstock quill is 3 in. in diameter. Headstock and bed are cast in one piece and a heavier tailstock is also used. Ball bearings are used generously throughout the lathe.

Manufacturing Lathe

DESIGNED primarily as a low-cost manufacturing lathe for simple turning operations, the new Rapiduction lathe developed by *Oster Mfg. Co.,* Cleveland, has a capacity of 1½ in. for cutting-off, boring, tapping, reaming, facing, threading and other lathe operations. Equipped with a cross slide and saddle, it can be quickly and easily set up for three operations. Swing is 13 in. over the bed and 6 in. over cross slide. Drive is from a 2-hp. motor, through multiple V-belts to a worm gear. The adjustable belt sheaves give spindle speeds from 140 to 1000 r.p.m. Tool post is provided with longitudinal adjustment for length of carriage. Face plate, automatic and universal, either manual or automatic stock stop, and other chucking equipment are obtainable.



Tool Room Lathe

ESPECIALLY adapted to fine tool room work, the new series S lathe offered by *South Bend Lathe Works*, South Bend, Ind., is available in 6, 7 and 8 ft. bed lengths with center to center distances of 34, 46 and 58 in. respectively. Swing is 16 in.



and headstock has $1\frac{3}{8}$ in. capacity through the spindle and takes collets up to 1 in. Attachments supplied with the unit include handwheel type draw-in collet chuck, telescopic taper attachment, micrometer carriage stop and thread dial indicator. Other accessories such as electric grinding and milling attachments are optional. Lathe is direct belt driven with eight spindle speeds from 21 to 725 r.p.m. A quick change gear mechanism gives 48 power longitudinal carriage feeds, 48 power cross feeds and 48 right and left-hand screw threads.

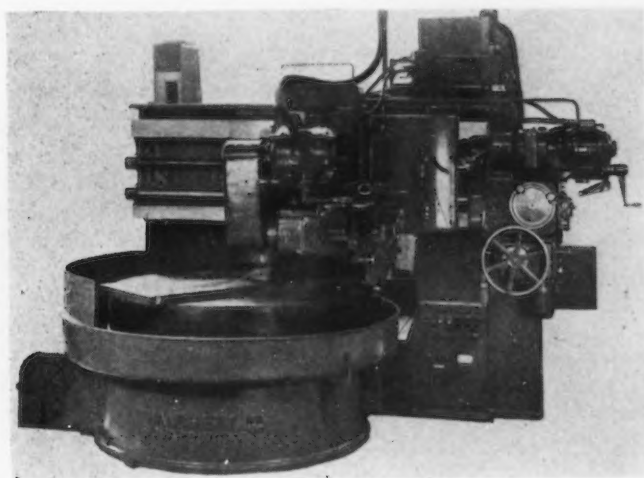
Surface Grinder

THE new Rotary Plano surface grinder being offered by *Hanchett Mfg. Co.*, Big Rapids, Mich., can be fitted with a straight wheel on a horizontal spindle or a cylindrical or segmental wheel on a vertical spindle. Grinding member is driven by a 30-

hp. motor and is mounted on a cross rail between two columns. This counterweighted rail has power elevation and is automatically clamped to both main and auxiliary columns. Grinding wheel head has hand and automatic down feed and adjustable cross feed with speeds of 3 to 9 in. per min. Ways on which wheel head travels are tiltable to an angle of 5 deg. in either direction. The 72 or 84 in. table is driven through a variable speed unit which gives speeds of from 6 to 18 r.p.m. Clearance is provided to swing work up to 90 in. in diameter. Illustration shows unit with magnetic chuck.

Rotary Surface Grinder

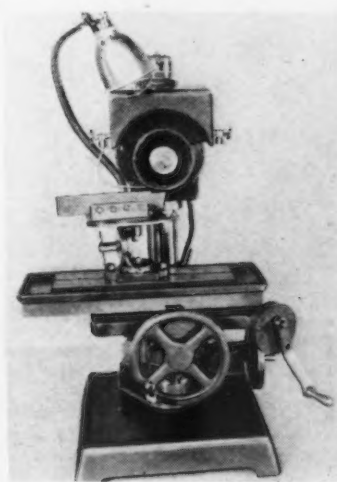
DEVELOPED especially for grinding aircraft engine crankshafts, the new No. 36 rotary surfacer grinder introduced by *Hanchett Mfg. Co.*, Big Rapids, Mich., is equipped with an 18 in. cylinder wheel which has a special diamond dresser to give a required radius to one corner of the wheel. Machine is also fitted with a



fixture to hold the crankshafts solidly so that the face where the counterweights are later attached can be ground square with the axis of the shaft to within 0.0004 in. Grinding wheel is driven by a 30-hp., 900 r.p.m. motor. The rotary fixture table is mounted on the conventional carriage and its position under the grinding wheel is controlled by a large handwheel at the front of the machine, permitting accurate positioning of the work to be ground.

Chip Breaker Grinder

CHIP breakers in carbide tools can be economically and efficiently ground, it is claimed, in the new grinder developed by *Carbology Co., Inc.*, Detroit. Design of the unit

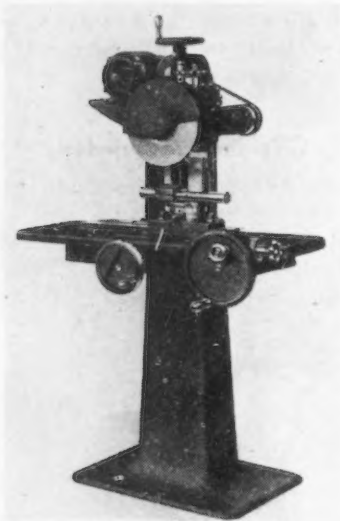


makes it possible to duplicate any number of times the exact form of chip breaker determined as ideal for any given operation. In operation the tool is clamped in a tool holder mounted on a universally adjustable fixture table fitted with three protractors to permit adjusting to correct setting in all directions. The tool is then moved under the wheel to a distance corresponding to the chip breaker width desired and the wheel is fed down while feeding the table back and forth. Grinder is designed for use with tools up to $1\frac{1}{4}$ in. wide.

Chaser Grinder

TO meet the demand for a single purpose chaser grinding machine for accurate resharpener of both the chamfer and the cutting faces, *Geometric Tool Co.*, New Haven, Conn., is offering its new No. 20 grinder. Work table is mounted directly on a plane ground surface and may be manually fed both longitudinally and transversely. Spindle housing is pivotally

mounted on a saddle equipped with three ground ways and can be adjusted vertically by a handwheel. Power is provided by a 1/3-hp. motor through V-belts. Longitudinal travel of table is 8 in. and working surface is 4 x 19 in. Distance from center of spindle to top of table is 2½ in. minimum and



13¼ in. maximum. For chamfering, a 9 x ¾ x 1¼ in. dish wheel is used and for face grinding with magnetic chuck a 9 x ½ x 1¼ in. wheel is employed.

Carbide Tool Grinder

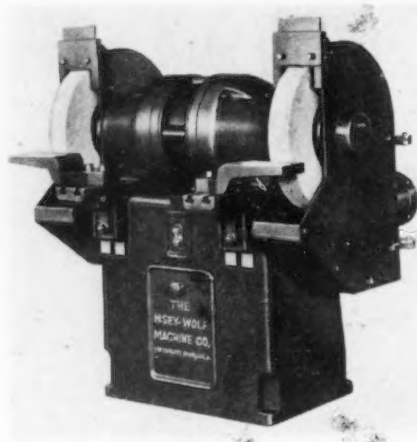
AMPLE power for grinding the heaviest cemented carbide tools and provisions for wet grinding are features of the new heavy duty grinder introduced by *Thomas Prosser & Son*, 120 Wall Street, New York. High-speed steel and stellite can also be ground. Absence of vibration is said to make machine suited for use of dia-



mond wheels in addition to the coarsest roughing wheels. Wet grinding equipment consists of a coolant pump, pan and settling tank. Nozzles are arranged so that flow of water can be directed on the tool, regardless of which side of the wheel is used. Quick acting indexing tables permit instant, accurate setting to the desired angle. Spindle runs in a double row, self aligning, precision ball bearings with dust seal, driven by double V-belts. Either diamond or silicon carbide cup wheels may be used. Roughing and finishing of both right and left-hand tools can be accomplished conveniently.

Pedestal Grinder

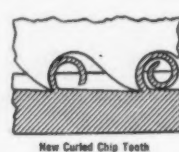
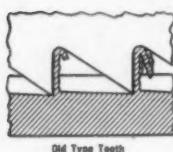
NEW line of pedestal grinders, equipped with new type guards which are in accordance with standards adopted by American Foundrymen's Association, is announced by *Hisey-Wolf Machine Co.*, Cincinnati. Machines are built in 18 and 20-in. wheel sizes driven by 5 and 7½-hp. motors respectively. Motors are to-



tally enclosed and ventilated through the pedestal. Design of the new guards makes it impossible for work to jam between wheel and guard. Guard extends far beyond periphery of wheels so that all sparks and chips are arrested.

Curled Chip Saw Sharpener

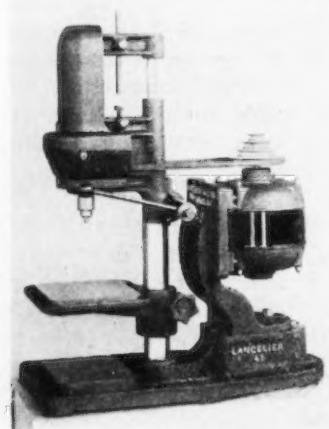
CONTROLLED by special cam action for exact clearances of high and low teeth as well as precise beveling, the new No. 11-30 saw



sharpener developed by *E. C. Atkins & Co.*, Indianapolis, in collaboration with *Covel-Hanchett Co.*, is designed especially for sharpening high-speed metal saws to the "curled chip" form. This system, shown in accompanying illustration, depends upon cutting with a rolling, coiling action rather than a pushing, telescoping action. The chips are coiled into a specially curved gullet and spring clear from the end of cut when tension is relieved. This action is said to permit maximum speeds and feeds and longer periods between sharpening.

Sensitive Drill

EXTRA large sealed type bearings are used on the sleeve carrying the driving pulley and also on the spindle and to take the drill thrust in



the new No. 41 precision drill offered by *Langelier Mfg. Co.*, Providence. Feed lever may be adjusted to several different positions and operating rack and pinion is protected by a guard. For drilling to a fixed depth, a coarse setting is made using a stop rod; then the final micrometer adjustment is obtained with a depth stop screw which has a fine thread and is checked in position. Chuck capacity is ¼ in.

Filing Machine

A NEW heavy duty continuous motion filing machine of improved design with a throat of 18 in. is announced by *Grob Bros.*, Grafton, Wis. Files are attached to a chain which is driven by a lower pulley having spring cushioned pins providing a positive drive to the chain. It is claimed that files will not slip, regardless of pressure applied to work. The filing chain consists of 20 5-in. files. Standard file styles available for use with this unit include single or double cut, fine, me-

dium, coarse or shear cut. Machine frame is of one piece welded steel construction and power is supplied by a ½-hp. motor through V-belts, giving



three speeds—80, 120 and 160 ft. per min. The tiltable work table measures 20 x 20 in. This machine is also available with 30 or 36 in. throat.

Center Point Lubricant

LINE of lubricants for center point oiling manufactured by *Chicago Mfg. & Distributing Co.*, 1928 West 46th Street, Chicago, has been extended to include a more viscous oil, having the consistency of a No. 2 grease. It is claimed that only one application of this oil is required for any job being turned and precision work is assured as lathe center can be drawn snugly against work. High-speed steel lathe centers are not necessary when using this lubricant.

Bevel Gear Generator

CAPABLE of rough and finish cutting straight bevel gears up to 35½ in. in diameter with pitches as coarse at 1½ diametral pitch, the new model 24 straight bevel gear generator introduced by *Gleason Works*, Rochester, N. Y., is said to permit operations 30 to 50 per cent faster than with previous models. New tool relieving mechanism and tool slides on this unit provide rigid tool support and permit higher stroke speeds than previously possible. Fully enclosed cradle is mounted on anti-friction bearings in a rigid housing. Work head is secured to a large base which slides on a one-piece frame. Feed for tooth depth and withdrawal for indexing are applied to a sliding base through a cam and adjustable lever. Cam has a double track, one for rough cutting and the other for the finish cutting. This generator is equipped with a

work spindle bored 6 in. nominal diameter at the large end with ¾ in. per ft. taper. This is said to facilitate chucking large shank jobs and to permit faster cutting because of increased rigidity. A new type universal stock dividing gage accommodates all pitches within the machine range and can be used for either even or odd numbers of teeth. Significant specifications are as follows: Cone distance, maximum 17¾ in.; pitch angle, 84 deg. 18 min. maximum and 5 deg. 42 min. minimum; ratios, 1-1 to 10-1; maximum face width 6 in.; index range, 10 to 200 teeth.

Swing Frame Grinder

UNIVERSAL swing frame grinding and polishing machines for wheels up to 14 in. in diameter are offered by *Jefferson Machine Tool Co.*, Cutter and Sweeney Streets, Cincin-

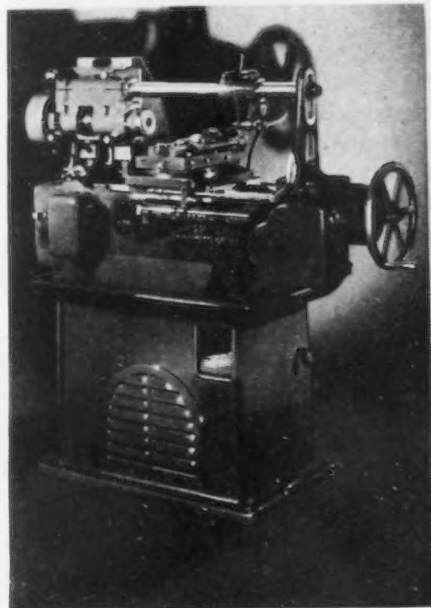


nati. These machines can be swung forward and backward, up and down, right and left and at any degree of angle or twist at the spindle head. They can be bolted to the ceiling, and require no alining. Unit can be used for grinding and cleaning castings and

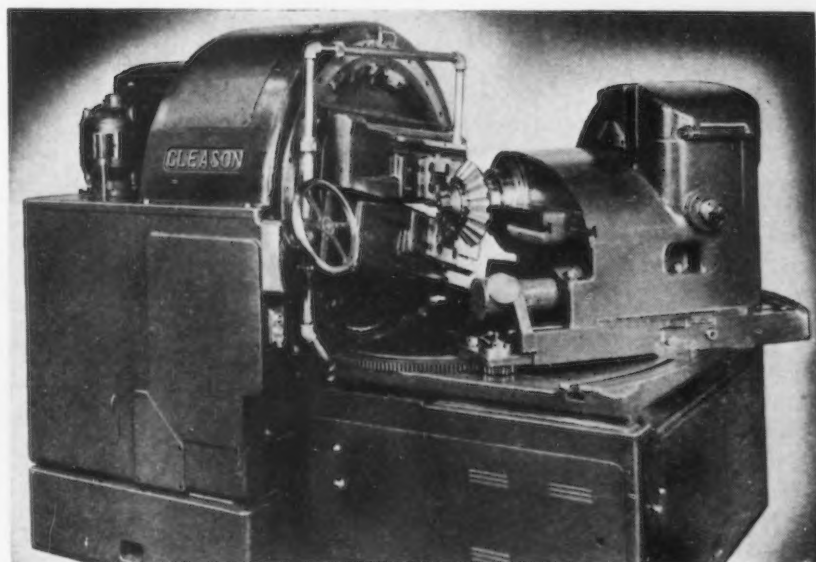
for grinding or polishing sheets, tubing, bars, shapes, etc. Counterbalancing cable and weights make operation of the grinder very light and easy to handle, reducing operator fatigue, it is claimed.

Hobbing Machine Accessories

SEVERAL new accessories are offered by *Barber-Colman Co.*, Rockford, Ill., for use with its No. 3



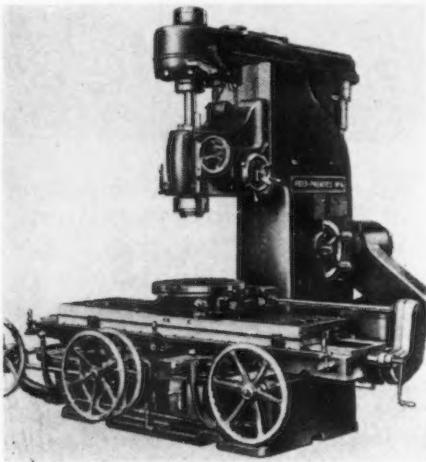
standard and No. 3 precision hobbing machines, which are said to increase the efficiency of these units and to adapt them for special classes of work. These machines have a capacity of 5 in. diameter, 7 in. face and 12 diametral pitch in cast iron or steel. The precision model has a guaranteed accuracy of not more than 0.0006 in. accumulative error between non-adjacent teeth on a 4 in. pitch circle. Among the new accessories are a ver-



tical feed which is valuable in cutting worms and worm gears, particularly worms blind at each end, and a horizontal cam feed for use on such work as speedometer gears where the cut is short. A handwheel operated collet is available which facilitates chucking from one piece to another. A lever operated collet for high production work and a special hob swivel are also available. This latter item is for work of too high an angle for the standard swivel to accommodate. Other accessories are: Left hand hob swivel; micrometer adjustment; taper hob spindle, and high speed hob swivel. This latter accessory is offered for fine pitch and small diameter work which usually requires smaller diameter hobs than the minimum size made for the standard $\frac{3}{4}$ in. spindle.

Vertical Miller

GEAR drive to spindle is a feature of the new No. 6 vertical miller and die sinker announced by *Reed-Prentice Corp.*, Worcester, Mass. Ma-



chine is designed to obtain maximum power and rigidity and Timken roller bearings are used throughout the drive. The saddle extends the full length of table, giving rigid support for heavy work. Power rapid traverse in either direction at 95 in. per min. is provided. Twelve spindle speeds and eight feeds for each spindle speed are provided. Throat depth is $28\frac{1}{2}$ in. and distance from center line of spindle to face of column is 18 in.

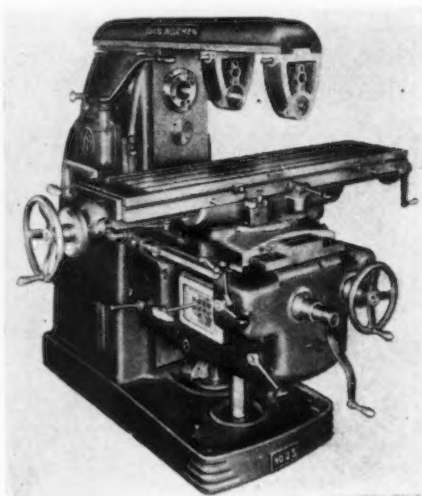
Dust Collector

DUST collectors which can be used with any grinder or buffer with wheels up to 18 in. diameter and 3 in. face are available from *United States Electrical Tool Co.*, Cincinnati. Dust and abrasive laden air is drawn into

a filter cabinet, where it strikes a baffle which directs the air downward to the bottom of the filter where heavy particles are deposited. The air is then directed upward through an all-metal filter pad and later returned to the room from top of filter cabinet. Suction fan and motor are located in the top of the unit.

Horizontal Miller

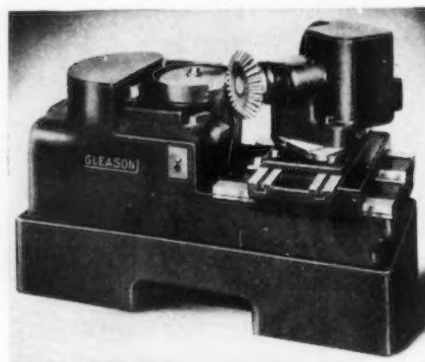
COMPANION to the recently announced model 2-L miller is the new No. 2-S horizontal miller offered by *Van Norman Machine Tool Co.*, Springfield, Mass. The model 2-S is available in both plain and universal types and has 18 spindle speeds from



25 to 1250 r.p.m. Both front and rear directional controls are provided for the unit's 18 feeds. Power rapid traverse is featured in all directions. Table is 50 x 12 in.

Bevel Gear Rougher

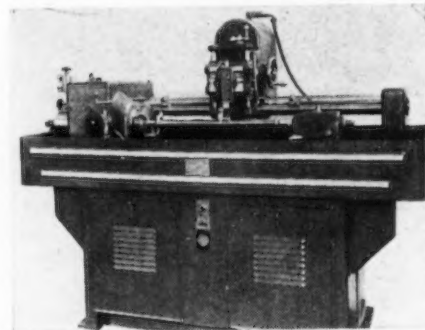
THE No. 7 straight bevel gear rougher announced by *Gleason Works*, Rochester, N. Y., employs a new method of rough cutting which permits closer roughing both as to taper and profile shape of the tooth. This new unit will handle gears up to



14 in. pitch diameter, 3 diametral pitch and 6:1 ratio in large or medium quantities. Fast cutting is possible with this machine, it is claimed, because of the rigid construction and small number of moving parts. Use of an hydraulic chuck and hydraulic movement of work head also add to cutting speed. Proper taper and profile shape of tooth slot are obtained by combined effect of the shape of the cutter blades and a horizontal motion of cutter spindle. A disk type cutter which has blades extending radially outward from the cutter body, mounted to rotate in a horizontal plane, is used. A single hydraulic control lever operates the work head for changing blanks, including chucking, movement of head and clamping of head. Indexing of work spindle is controlled by change gears. Feed rate is 4 to 33 sec. per tooth and index range is 13 to 100.

Superfinisher

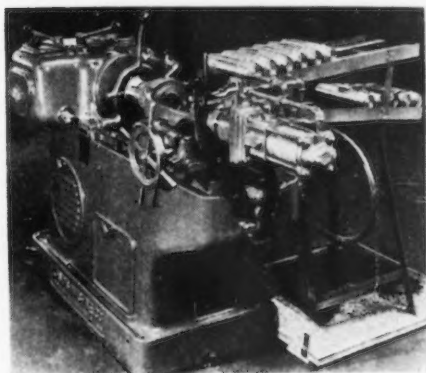
THE new general purpose 4 x 36-in. superfinisher announced by *Foster Machine Co.*, Elkhart, Ind., is designed to accommodate work larger than can be handled by the company's 4 x 18-in. machine. This new unit is described as ideal for larger size guide bars of die sets, piloted boring bars and other cylindrical work up to 4 in. in diameter and 36 in. in length. Unit can also be adapted to handling work approximately 50 in. between



centers. This machine is designed for collet, chuck or center work and may be provided with centerless and flat surface attachments. A special feature of this new model is a mechanical drive for the traverse which also has hand adjustment for positioning. Bars carrying the superfinishing head are horizontally parallel to reduce overall height. Spindle is driven by Graham transmission with stepless range of speeds from 0 to 500 r.p.m. Machine is equipped with a quick stone retraction device and standard or double stone holders are available.

Shell Nose Tapper

THE No. 1½ R shell tapper announced by *Landis Machine Co.*, Waynesboro, Pa., is designed for tapping the nose end of shells ranging in size from 75 to 155 mm. at an average rate of 90 to 115 shells an hour. The carriage consists of a work supporting cradle, a hardened and ground bushing which supports the nose end of the work and a female center which supports the base end. Center movement is actuated by an air cylinder. In operation this center pushes the work forward until it sets firmly in the ground bushing supporting the nose end. This effects a locking action which holds the work rigidly in alignment for tapping. Machine spindle is equipped with a collapsible tap designed especially for this work and



provided with internal ducts through which the cutting coolant is conveyed directly to the cutting edges of the chasers. Another feature is the tripping collar which also functions as a pilot to assure the maintenance of unusually close tolerance for alignment of thread with the body of the shell.

The action of the tripping collar eliminates the danger of the chasers striking the shoulder at the bottom of the work.

Machine Leveling Device

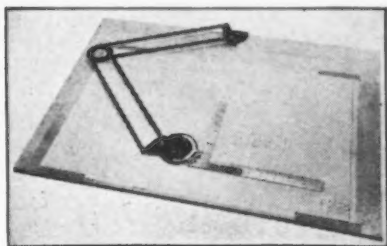
AN inexpensive accessory for leveling and keeping heavy machinery in alignment is the GY-A-LINER de-



veloped by *Guy Mafera*, 22 Tobin Avenue, Revere, Mass. Unit can be made in any metal desired and is self-aligning up to 2 deg. angle. Pivoting action of the convex surfaced base plate automatically aids in obtaining a level bearing. Take-up mechanism raises or lowers the supporting height.

Drafting Machine

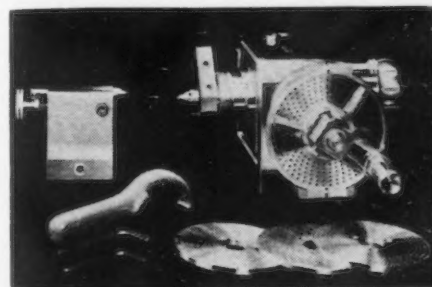
LOW priced, completely adjustable ball bearing drafting machine for drawings up to 24 x 36 in. is offered by *L. G. Wright, Inc.*, 5209-37 Euclid Avenue, Cleveland. Machine, called the Wrigraph Industro Drafter, is equipped with eccentric adjustments



through which it is calibrated and accuracy of the instrument controlled. One-half degree vernier equipped with a magnifier gives quick and accurate setting of all angles. A variety of extension clamps are available and a leveling screw is provided, for adjusting the machine to plane of drawing board.

Index Center

HARDINGE BROS., INC., Elmira, N. Y., are offering new index centers with their precision tool room milling machines. Spindle nose is threaded 2 3/16 in. diameter, 10 threads and interchanges nose attachments and collets with the machine



spindle. Spindle carrier swings through a vertical arc and is graduated for settings from 10 deg. below horizontal to 20 deg. beyond vertical. Spindle is ground to take standard 5C Hardinge collets which have a range from 1/16 in. to 1 in. round, 7/8 in. hexagon or 23/32 in. square. Ratio of 4:1 between spindle and the index plate crank is provided instead of the usual 40:1 ratio. Index plate mounting is independent of gearing with spindle and crank. Index head keys fitting the table are removable. Work 7 in. in diameter can be swung on the head.

Colored Stainless Steel

A MULTITUDE of colors can now be given to the surface of stainless steel by a simple treatment with sulphuric acid, according to a patent (No. 2,219,554) recently issued to Clements Batcheller, of Glens Falls, N. Y.

The acid treatment imparts to the steel a colored film having a surface said to be even smoother than the original stainless steel surface. The color ranges from gold to brown-black. What color is obtained depends on the

temperature and length of time the acid is applied.

It is pointed out that large stainless steel surfaces because of their single, steely luster are monotonous to the eyes. The new treatment breaks down this monotony, it is declared, by providing color tone effects.

The treatment involves soaking the steel in a solution of sulphuric acid at a concentration which would normally dissolve the metal. However, dissolution is prevented by the presence of

an "etching inhibitor," a given example of which is potassium permanganate.

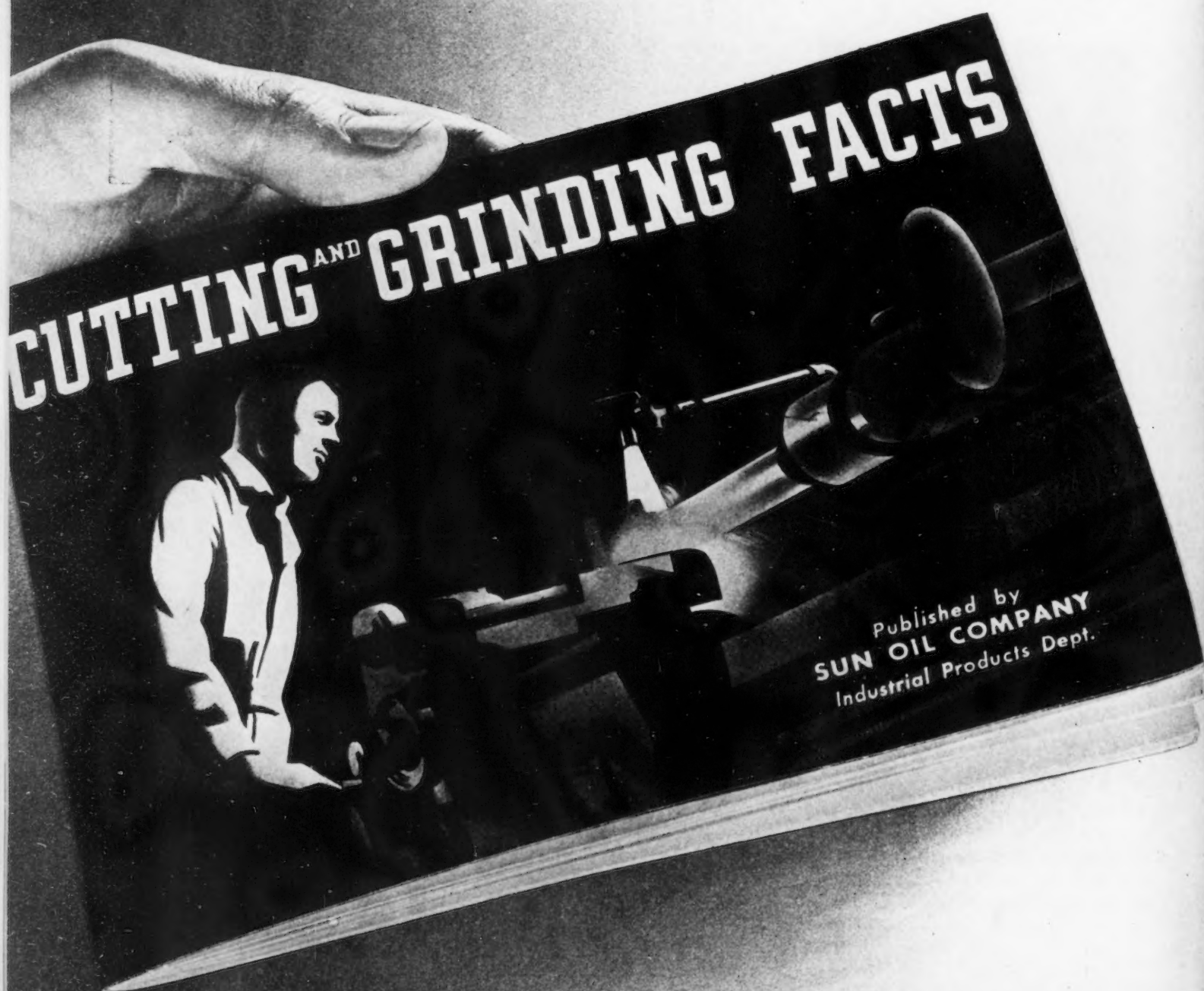
The stainless steel which is being colored is permitted to remain in the acid until a film of the desired color is formed on its surface. The color is formed by oxidization of the chromium, iron, cobalt and nickel elements present in stainless steel.

The assignee of the patent is the Allegheny Ludlum Steel Corp., Pittsburgh.

FACTS PERFORMANCE DATA

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... a new booklet—describes modern
machining methods and gives data on
48 different operations ...



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Here's a book you'll want to read and keep handy for future reference. It's packed with real, worthwhile, factual information on "rated capacity runs," by expert operators, on the most modern machine tools.

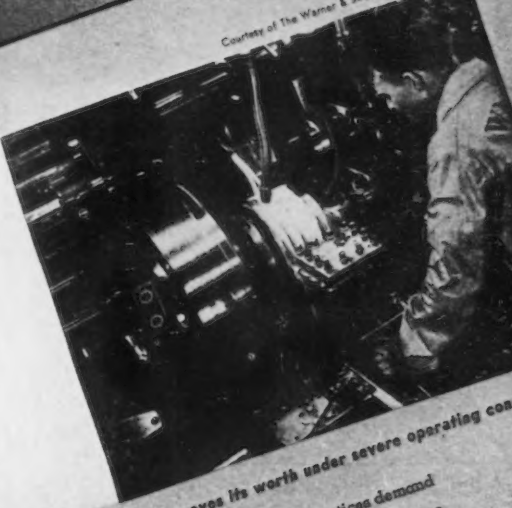
Lathe Work . . . Milling . . . Hobbing . . . Drilling . . . and Grinding are all covered with individual photos and performance data on 48 different metal working operations — facts and illustrations that can help you solve your own production problems.

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SUNOCO

EMULSIFYING CUTTING OIL

Lathe Work



Courtesy of The Warner & Swasey Co.

OPERATION:
Turn and Drill Roller Bearing for Steam Shovel

MACHINE:
Warner and Swasey 4-A Universal Turret Lathe

MATERIAL:
S.A.E. 1035 Steel

SPINDLE SPEED:
19 R.P.M.

CUTTING SPEED:
60 S.F.P.M.

FEED:
.0165 inch


DEPTH OF CUT:
1 inch

CUTTING LUBRICANT:
1 part Sunoco to 20 parts water

Sunoco proves its worth under severe operating conditions.

Multiple cuts, high speeds, continuous operation of today's production practices demand a never failing supply of an efficient cutting lubricant. That's why builders of fine machine tools recommend the best possible cutting lubricant to maintain peak performance.

Milling



OPERATION:
Slab Milling Motor

MACHINE:
Sundstrand Hydro-Se

MATERIAL:
Cast Iron

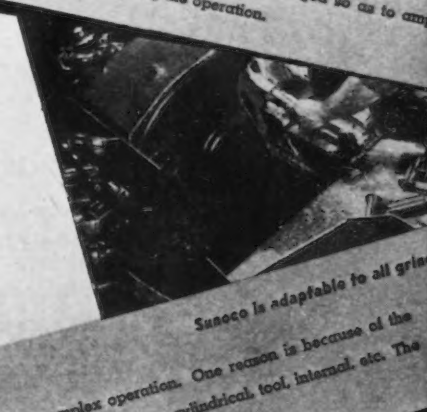
CUTTING SPEED:
80 S.F.P.M.

FEED:
8 inches per minute

CUTTING LUBRICANT:
1 part Sunoco to 30 parts water

Sunoco helps prolong cutter life.

The cutting lubricant should be flooded over the milling cutter in a large slight pressure. The distribution system should be arranged so as to arrange work and the cutters prior to and during the operation.



OPERATION:
Plunge cutting wheel 3" x 1 1/4"

MACHINE:
No. 2 Cincinnati Centerless Grinder

MATERIAL:
Cast Iron

METHOD EMPLOYED:
Infeed

STOCK REMOVAL:
.005 inch

LIMITS:
Plus or minus .001 inch

COOLANT:
1 part Sunoco to 30 parts water

Sunoco is adaptable to all grinding operations.

Grinding is still considered a very complex operation. One reason is because of the many grinding operations such as centerless, cylindrical, tool, internal, etc. The factor in all kinds of grinding.

SUN OIL COMPANY, Dept. 5
Philadelphia, Pa.

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DETROIT — Since one of the announced objectives of the defense commission is to broaden the industrial base upon which the armament program is being built, it is a prime necessity that a greater number of concerns, large and small, be brought into the picture.

The defense commission is now seeking through various channels the ways and means to reach a greater number of manufacturers, either for purposes of direct contracting for war matériel, or to have them serve as sub-contractors on vital work now being let.

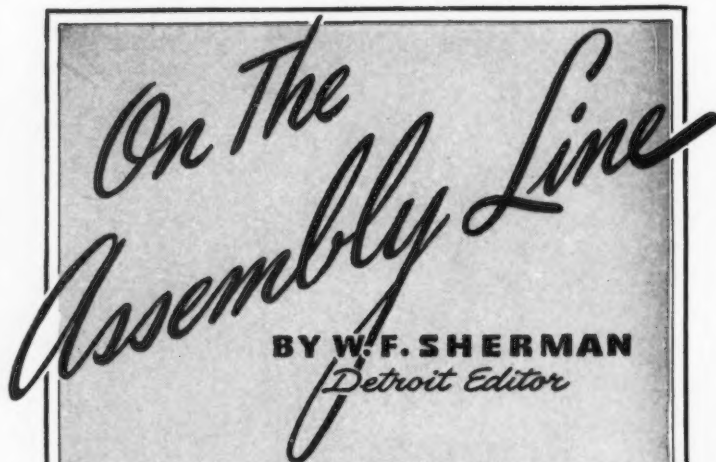
In the defense program the first important letting of sub-contracts for manufacturing has been from the aircraft industry to the automotive and allied industries. The program initiated recently by Douglas Aircraft Co. is, therefore, extremely significant and the methods being followed in this case must, without doubt, be applied more generally to "even up" the burden of preparing for defense.

It is apparent that in the current activities of the Automotive Committee for Air Defense, Inc., the path pioneered by Douglas is likely to be followed. In fact, at the time the ACAD was being organized in the offices of the Automobile Manufacturers Association here, samples of the parts which Murray Corp. and Briggs Mfg. Co. will make for Douglas were exhibited to leaders of the automobile industry to show them what would be required in the program proposed to them by William S. Knudsen, defense commissioner.

\$100,000,000 Work to Be Sublet

The difference between the private Douglas contract and one proposed by the defense commission is principally one of size. Under Douglas' arrangement outside producers will fabricate \$100,000,000 worth of parts for Douglas to assemble; under the defense commission plan, the automobile industry will fabricate about \$500,000,000 worth of parts for 12,000 bombers which will be assembled by three airplane companies. If plans work out as currently projected, the defense commission's program will eventually double the half-billion figures and will require about one billion dollars' worth of parts for 24,000 bombers, instead. This is based on reports that the British also will order 12,000 bombers duplicating the U. S. order.

The Douglas sub-contract business is being placed with automotive and manufacturing concerns in Pennsylvania, Ohio, Michigan, Missouri, Colorado and California. The lion's share of the contracts has gone to the Murray Corp. of America, the Briggs Mfg. Co., the Fisher Body division of General Motors Corp., all of



• Defense Commission through various channels is now trying to bring into its program a large number of small shops, particularly as sub-contractors . . . Plan being worked out for aircraft work is an example . . . Car assemblies at a new autumn high

Detroit; Fleetwings, Inc., Bristol, Pa.; Goodyear Aircraft Corp., Akron, Ohio; McDonnell Aircraft Corp., Robertson, Mo.; and Aircraft Mechanics, Inc., Colorado Springs, Colo. Large orders also were scheduled to be placed with Solar Aircraft, San Diego; Hammond Aircraft Products, South Gate, Calif.; Axelson Mfg. Co., Los Angeles, and Vega Airplane Co. of Burbank, Cal. According to Maj. Carl A. Cover, senior vice-president and general manager of Douglas, and Walter A. Hamilton, chief of matériel, contracts in excess of \$75,000,000 have already been signed.

To handle the output of this group of fabricators, Douglas has announced that a new plant at Long Beach, Cal., will be used for assembly purposes, fed

by the plants listed in six states ranging almost from coast to coast.

Word from Douglas is that the planes to be built under this program include bombers, cargo transports and observation airplanes. The Fisher plant will do most of the tooling for the sub-contracting work, according to Mr. Hamilton. Murray and Briggs will build inner and outer wing panels and horizontal stabilizers. Fleetwings and McDonnell Aircraft will build vertical fins, rudders and cowl flap assemblies for the bombers. Goodyear will build outer wing panels for the cargo transports. The other companies will build smaller assemblies such as tail cones, collector rings, cowl flaps, etc.

Fifty specially designed railroad box cars with built-in racks will be shuttled across the continent between the plants of the sub-contractors and the Long Beach plant, feeding the sub-assemblies into the final assembly line. Coordination of this nationwide set-up will be directed in the field by Fred Essig and Fred Rockelman, liaison executives, with a staff of 25 to 50 Douglas engineers, inspectors and production experts who will probably have their headquarters in Detroit, where they are now.

Real Progress Will Take Time

Mr. Rockelman, incidentally, is former general sales manager of Ford Motor Co., and in the period around 1930 he was president of Plymouth.

Progress of the Automotive Committee for Air Defense has been necessarily limited because of the short time that it has been in existence. It was only six weeks ago that the organization was called into existence at the meeting between representatives of the industry and Mr. Knudsen. Only last week the ACAD was incorporated and given its permanent executives.

This workman is using a 5/16-24 "G.T.D. Greenfield" Ground Thread Tap—turning it with a "G.T.D. Greenfield" Tap Wrench, and testing the hole with a "G.T.D. Greenfield" Plug Thread Gage.

*Here's a
Tough
Job!*



For Accuracy: "G.T.D. Greenfield" Precision Ground Taps and Precision Thread Gages.

This looks like aluminum—actually it's chrome molybdenum steel, No. 46S23, tensile strength, 180,000 lbs. It's an elbow assembly for aeroplane landing gears and production conditions require a hand operation with precision ground thread taps. We are told that production is only 60 holes per tap, and taps have to be sharpened after every 10 holes. Pretty low? Well, before "GTD Greenfield" taps were used the production was only 35 holes per tap with 6 holes between grinds.

The fact that "Greenfield" taps excel on extremely tough assignments is extra assurance that they will turn in equally superior performances on easier jobs. Don't you want to arrange a test?

GREENFIELD TAP & DIE CORPORATION, Greenfield, Mass.

Detroit Plant: 2102 West Fort St. Warehouses in New York, Chicago, Los Angeles and San Francisco. In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.



TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

To those who expect to see miracles accomplished by just pushing buttons, it may be necessary to repeat the counsel often given before in the defense program—the time element must be respected.

Douglas reveals, for example, that preliminary studies and negotiations with the sub-contractors began months ago and were well under way before the first of the contracts in the procurement program from the United States government (Army and Navy) were signed. Nearly two score of executives and engineers from Eastern areas spent weeks in California, working on the preparations before the go-ahead was given.

On this new ACAD program appropriations are only being studied now and cannot be acted upon until Congress meets after the first of the year. It is not likely that the principal contractors—reported to be three of the major airplane companies—will be named officially until that time. Possibly not until then will the automotive committee proceed with its assignment from Knudsen to inspect and study the aircraft plants in operation. Then, after the designated plants have been studied, the ACAD can proceed with its second job of coordinating automotive facilities that are adaptable to aircraft fabrication.

Cooperation on a huge scale between the aircraft industry and the automobile industry will be necessary to do the job. Some differences of opinion must be compromised or buried to accomplish this successfully.

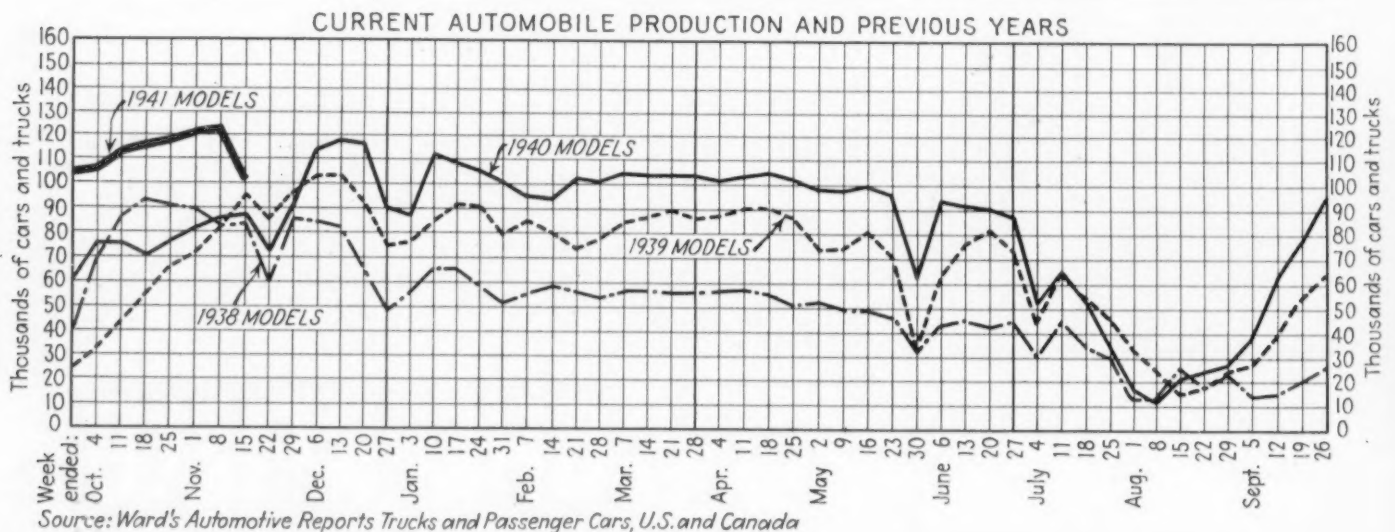
Frankly, automobile people are inclined to regard the super-super-refinements of the aircraft industry as unimportant trifles; they will learn that they are not right in such assumptions. On the other hand, the aircraft industry's executives and engineers will look askance at every attempt that the automobile industry makes at a short cut; they, too, will learn that short cuts can be taken without hurting the product and that mass production technique does not imply slipshod work, but rather serves to insure accuracy and reliability.

Aware that our next door neighbor, Canada, has banned all new models of passenger automobiles and other "non-essential" products, the automobile industry is showing signs of redoubling its efforts to turn out as many cars as possible while there are no restrictions on such production in this country. The retail buyer is perhaps equally cognizant of the fact that it might be smart to buy while buying is possible. However, this attitude has not been encouraged by the industry because of the many ill-effects that accompany it.

Production soared in the post-Thanksgiving week in Michigan to 128,783 passenger cars and trucks compared with 102,340 in the previous week and 93,638 in the corresponding week of a year ago. According to Ward's automotive reports, this establishes a record far in excess of the 120,948 in an earlier week in November and also exceeds by a comfortable margin the best output recorded last year when assemblies reached 118,405 during one week in December.

With delivery of the first 60 1/4-ton midget trucks by Bantam to the Army scheduled to be completed last week, it became known that the Army has already ordered some 4500 of these vehicles. Bantam, Ford and Willys are to manufacture 1500 each starting immediately. Since all will draw certain basic parts from the same supplier, it is known that the total daily production will be 150 cars a day. These are being built virtually by hand, while tooling is pushed as rapidly as possible so mass production of these vehicles can be undertaken. It is indicated that 30,000 will be completed and delivered within the next 10 months, and it has been predicted in some quarters that the Army will call upon the automobile industry to supply 50,000 to 75,000 of them. These vehicles carry three soldiers each.

PRODUCTION COMPARISONS					
	Oct., Nov., and Dec.	Jan., Feb. and March	April, May and June	July, Aug., and Sept.	Total
1938 MODELS	1,032,201	753,470	628,961	313,091	2,727,723
1939 MODELS	1,014,799	1,086,350	971,417	510,561	3,583,127
1940 MODELS	1,162,990	1,325,630	1,233,585	583,568	4,305,773
1941 MODELS					



Wanted: Tough broaching jobs

● Every year Oilgear broaching machines are adding more and more speed to production lines . . . and cutting production costs. Every year Oilgear broaching machines are solving new tough production problems. They are the product of unmatched hydraulic experience and continuing research, and they possess an enviable reputation where broaching methods are vital. They have played an important part in the development of modern broaching advances and in eliminating many seemingly permanent "bottle-necks" in modern production lines.

And now, the re-designed Oilgear Broaching Machines are licking tougher production problems than ever . . . are knocking costs per operation down to an unprecedented low.

Every Oilgear Broaching Machine has been definitely improved so that it is unusually convenient to operate; it reduces the operator's work and effort; it gives faster broaching and return speeds which are independently variable; it provides new tool and work capacities and new high standards of precision broaching.

Regardless of the broaching operation, you can do it faster, more profitably and economically with Oilgear. We suggest you send at once for the new Oilgear Bulletins describing these improved machines in detail.

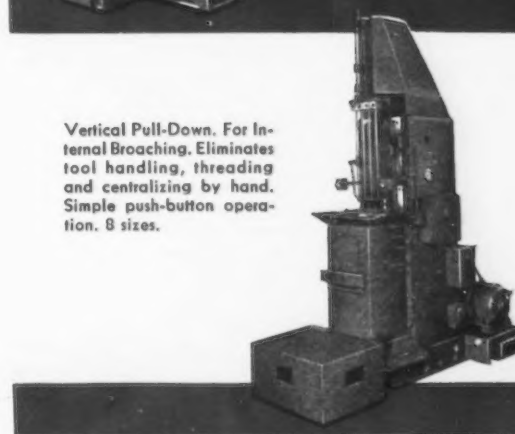
Use the handy coupon below. Send for any or all of these bulletins at once. Don't delay. They mean sizeable profits for you. THE OILGEAR COMPANY, 1324 W. Bruce Street, Milwaukee, Wisconsin.



Left: Gooseneck Broaching Presses are made in 5 sizes. Open design permits straight line production. Simple time and motion saving control.



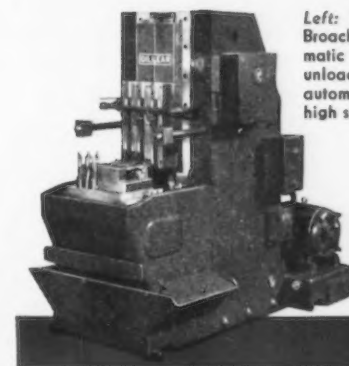
Right: Two Column High Speed Broaching Press minimizes cycle time. Cushioned ram motion increases tool life. Provides sensitive control of variable ram speed.



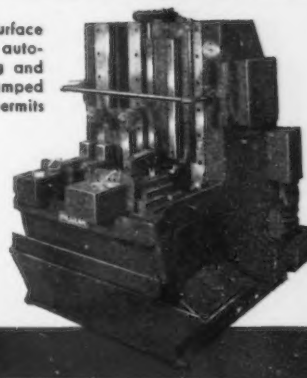
Vertical Pull-Down. For Internal Broaching. Eliminates tool handling, threading and centralizing by hand. Simple push-button operation. 8 sizes.



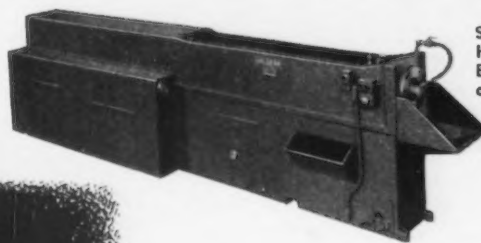
Cyclomatic. Simplified automatic internal broaching. Improved design. Handles multiple broaching. 3 sizes. Convenient loading level regardless of size or stroke.



Left: Single Slide Vertical. 11 Sizes. Surface Broaching. Manual, semi-automatic and full automatic control. Shuttle table makes loading and unloading easier. Work clamped and unclamped automatically. Harmonic table motion permits high speed without shock.



Right: Double Slide Vertical. 11 Sizes. Surface Broaching. Sequent operations on one or more parts on same machine. Speed of each slide independently varied to suit job. Control and shuttle table features same as Single Slide Broach.



Single and Double Ram Horizontals. High speed, Internal and External Broaching; accurate, extra-convenient control and operation.

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| <input type="checkbox"/> XD & XS Vertical Surface Types | <input type="checkbox"/> XP Vertical Pulldown |
| | <input type="checkbox"/> XM Vertical Cyclomatic |

Name Title

Company

Street

City State

WASHINGTON —

It was war demand that set a record in 1917 for exports of American iron and steel products. In that year shipments abroad aggregated 6,268,546 gross tons. Again it has taken war demand to break the 23-year record and break it by a wide margin. Exports for 1940 will approximate 8,000,000 tons, or about 1,730,000 tons in excess of the former peak export movement.

The sharp jump in exports has been due to large requirements for Great Britain now that that country has to rely solely on itself and the United States as its arsenal. Outgoing shipments to England have been running at the monthly rate of 300,000 to 400,000 tons, and if British capacity is reduced or destroyed by the German attack still heavier American shipments will be necessary. They would create a problem for the domestic industry which already is near capacity operation. Such a condition might easily require curtailment of civilian requirements or establishment of priorities and hasten the licensing of steel exports similar to the policy respecting foreign scrap shipments which now are restricted to the United Kingdom and the Western Hemisphere.

In the first nine months of 1940 iron and steel exports to the United Kingdom amounted to about 1,800,000 tons or approximately one-third of the total exports of 5,489,951 tons during that period. It is quite conceivable that exports to the United Kingdom for the 12 months of the present year will be about 3,000,000 tons, which would be 37½ per cent of the estimated total.

Little Finished Steel to U. K.

British purchases consist chiefly of pig iron, and raw and semi-finished steel, mostly the latter, which means that so far they have not put any direct strain on finishing mill schedules. Under the Department of Commerce classification of ingots, blooms, billets, etc., not containing alloys, exports to the United Kingdom during the January-September period of the current year were 1,339,224 tons. Pig iron exports to the United Kingdom during the nine months were 338,807 tons, while merchant bar shipments were 66,718 tons and shipments of plain ungalvanized steel sheets, not containing alloys, amounted to 28,708 tons. Plain hot rolled strip, hoop and band steel exports were only 8986 tons.

Canada took about 360,000 tons of American steel in the nine-month period, the largest item being plain sheets, shipments of which totaled 101,033 tons. Raw

and semi-finished steel exports to Canada during the nine months were 88,142 tons, while skelp exports totaled 79,295 tons, plain hot rolled strip and band steel, 36,013 tons and merchant steel bars, 24,240 tons.

Japan took about 145,000 tons of American steel during the January-September period, of which 93,707 tons consisted of raw and semi-finished material, 29,296 tons of merchant steel bars, 12,902 tons of hoop and band steel and 6194 tons of plain sheets.

Scrap exports to the United Kingdom and Japan during the nine months were almost equal, those to the United Kingdom amounting to 811,467 tons and those to Japan 811,070 tons. Scrap exports to Canada were 290,889 tons.

As the situation now exists and as far as the future can be seen, the prevailing view of those in charge of the defense program is that present steel capacity, together with expansion of some units, will adequately meet demands. There are, of course, some in administration circles who do not share this opinion. Those who think there will be sufficient steel point out that the position of the steel industry regarding its ability to meet both defense and civilian demands is much clearer than it was during the first World War as shown by analyses made by experts of the commission. One problem is that of determining requirements and smoothing out deliveries in the order of their importance. It has been conceded that, despite the desire not to interrupt civilian requirements, the latter may have to be curtailed in instances or delayed. At the same time it was stated that the industry itself is handling the situation so well that so far no official steps have had to be taken by Washington.

Outwardly Unconcerned Over Labor

As yet Washington is showing no outward concern, at least regarding the danger of interruptions to production in steel by labor trouble, though it is suspected that an uneasy eye is watching SWOC's moves which, as pointed out in THE IRON AGE of Nov. 28, page 79-c, look to wage increase demands. Also Washington has not overlooked statements of Philip Murray at Atlantic City, upon his election as head of CIO, indicating intensification of SWOC's drive to organize "little steel."

What is the Administration policy toward labor demands for wage increases? The answer is that the Administration is said to have adopted what some officials say is the British policy. England, they claim, in its stress of war, has shown only a "friendly resistance" to wage increases, but has shifted a lot of

Washington

BY L.W. MOFFETT
Washington Editor

• War may lift U. S. exports of steel to 8,000,000 tons for 1940, an all-time peak . . . Administrators of defense program believe capacity is ample to meet demands . . . Possibility of wage demands is studied

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PRODUCTS

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Carbon, Copper or Alloy Steels—in any Open Hearth analysis, in any quantity—to meet your specifications . . . Welding qualities, toughness, abrasion resistance, ductility . . . There is an "A.W." Steel made to Alan Wood standards that will give you best results at the lowest possible cost.

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Foundry, Malleable and Basic.

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Alloy and Carbon Grades. Forging and Re-rolling Qualities.

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All qualities, special Alloy, Annealed, Blued Finish, Hard Red, Pickled, or Deoxidized.

FLOOR PLATES

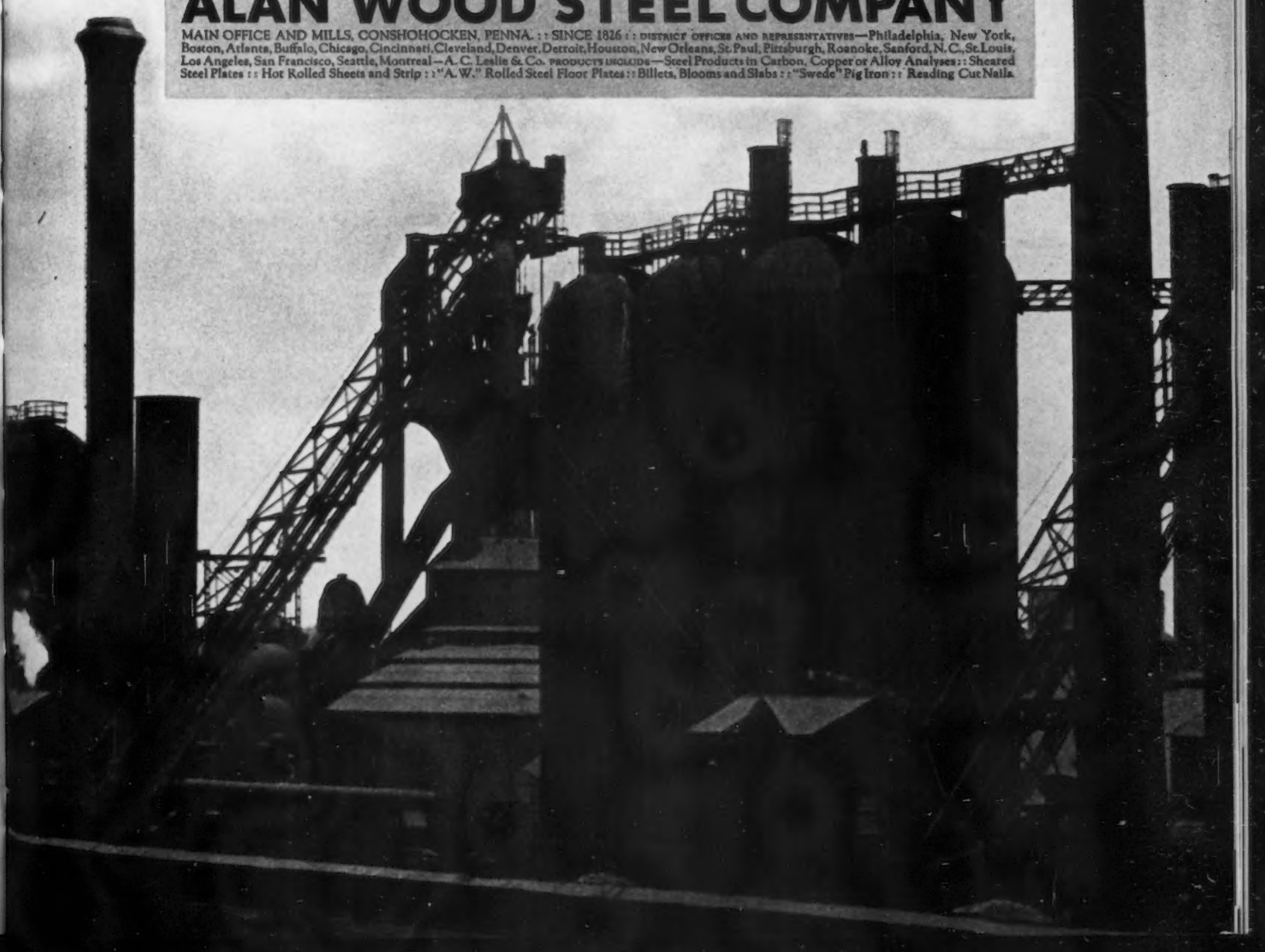
For every kind of flooring condition: "A.W." Super Diamond, Standard Diamond, Diamondette, Sunken Diamond and Ribbed Patterns. Any pattern furnished in ferrous or non-ferrous analysis.

STEEL CUT NAILS

"Reading" Brand—all types and sizes.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. : SINCE 1826 : DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, New Orleans, St. Paul, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal—A. C. Leslie & Co. PRODUCTS INCLUDE—Steel Products in Carbon, Copper or Alloy Analysis : Sheared Steel Plates : Hot Rolled Sheets and Strip : "A.W." Rolled Steel Floor Plates : Billets, Blooms and Slabs : "Swede" Pig Iron : Reading Cut Nails.



responsibility to labor, which has been told what the government wants and cautioned against making any demands that would result in unreasonable price rises in food. The English government, so it is said, considers that there is no need to worry so long as a large supply of food is available at reasonable prices.

Unit Costs Reported Lower

Their position has been stoutly challenged, but Washington officials who watch wages and prices, maintain that the nation has its most favorable period of economy. Wages, they urge, must be thought of mostly in terms of unit cost and not so much in terms of wage rates. Due to technological developments, it is claimed that productivity has greatly expanded, with the result that the unit wage cost now stands at 54. In England, the wage cost situation is sized up as follows: Taking September, 1940, as 100, wage rates have increased 12 to 14 per cent; cost of living 20 to 25 per cent and wholesale prices about 30 per cent.

Washington contends it is "licking" wage costs by keeping down unit costs. It pretends not to be alarmed over wage increases, though it is evident it would not be surprised to see CIO (miners) unions under rebellious John L. Lewis force wage demands more than other unions.

Wage costs in steel are recognized as being "tremendously" important both because of the size of the industry and its employment and of the many industries and their large number of employees that steel supplies. It may be an easy way of letting the problem slide, but it is maintained by keeping a liberal supply prices will stay down, even though wage costs rise.



Washington

••• Six of the most important manufacturers of steel castings, according to a survey by the Federal Trade Commission, made total net sales in 1939 of \$53,089,769, of which 98.3 per cent represented domestic sales and 1.7 per cent

foreign sales. Total operating outgo, including raw materials, wages, taxes, depreciation, amounted to \$46,163,610, the FTC said.

In a survey of annual financial reports from companies operating in principal industries, the commission made public in combined form, so that the figures on any one corporation remain undisclosed, tabulations showing that the combined net income represented a rate of return of 7.4 per cent on total employed capital for the year. Two corporations with rates of return above the average enjoyed a return of 14.8 and 21.1 per cent. Rates for the other four ranged from 3.9 per cent to 6.4 per cent.

Operating ratios indicated the cost of goods sold—exclusive of taxes, research and development, selling and administrative expenses—represented 74.3 per cent of total sales. Raw materials represented 23.5 per cent; production wages and salaries, 31.8 per cent; depreciation and obsolescence of plant facilities, 6.5 per cent; and finished goods for resale, 1 per cent.

Total inventories amounted to \$11,922,725 at the beginning of 1939 and \$16,470,210 when the year ended—an increase of 38.1 per cent, the FTC study showed.



Washington

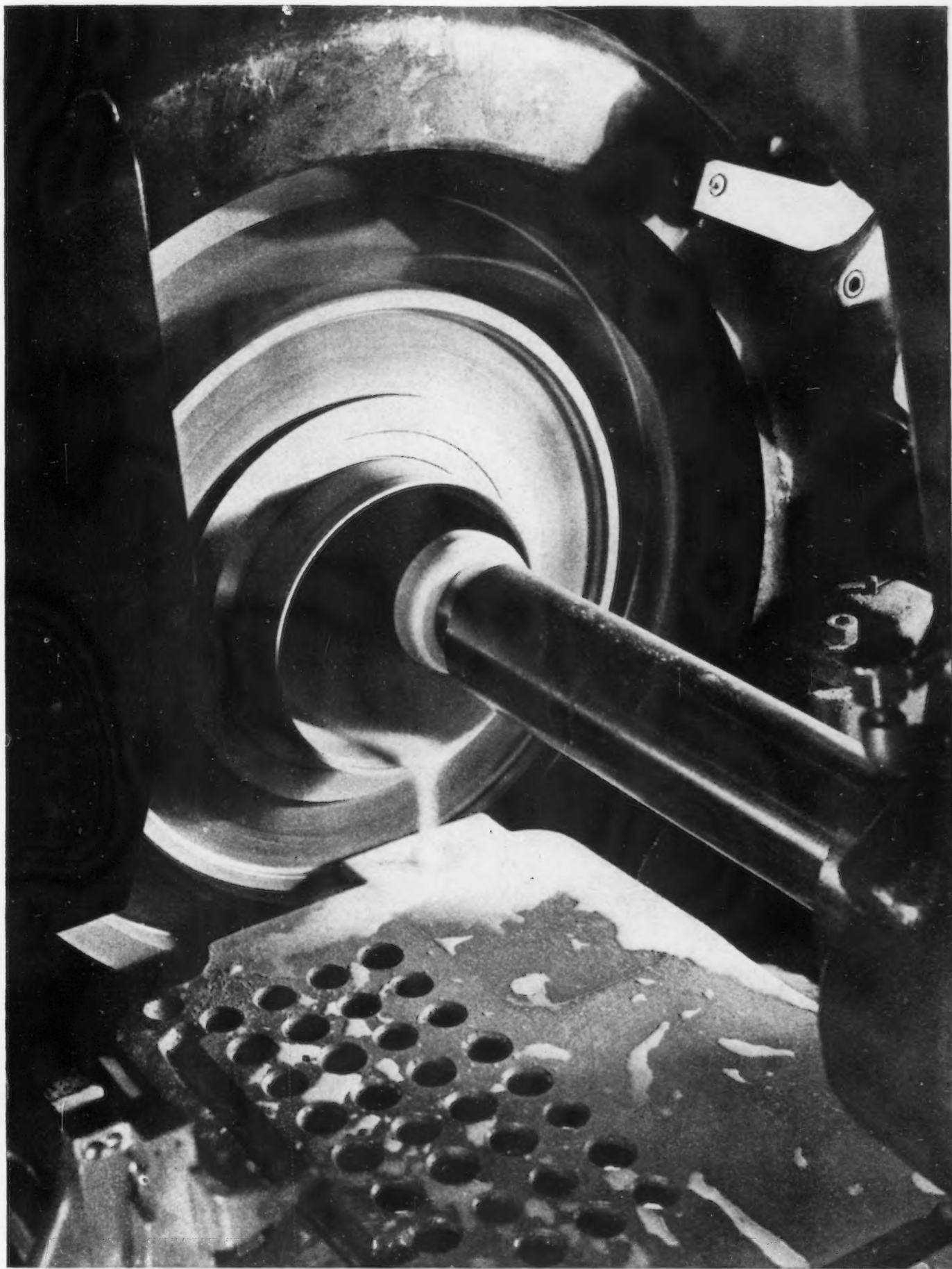
••• Galvanizing by plants not operated in connection with rolling mills reported slight increases in production and employment and slight decreases in wages for 1939 as compared with 1937, figures compiled by the Bureau of the Census show.

Value of products increased from \$5,994,070 in 1937 to \$6,195,640 in 1939, number of wage earners increased from 1119 to 1212 while their earnings declined from \$1,376,140 to \$1,342,647. For census purposes the industry covers establishments primarily engaged in coating sheets and formed products with zinc, aluminum and lead, and in retinning, the latter process being included as an operation distinct from manufacture of tin plate and terne plate for which separate production figures are compiled.

THE BULL OF THE WOODS

BY J. R. WILLIAMS





Mirror finish is obtained on the bore of airplane engine cylinders without honing when they are ground on Bryant Internal Grinders. Greater accuracy, finer finish, and higher production from new Bryant Grinders

will write a new cost story in *your* plant on *your* production—start today by sending prints to the **BRYANT CHUCKING GRINDER COMPANY**, Springfield, Vermont, for a complete cost analysis.

Fatigue Cracks

—BY A.H.DIX—

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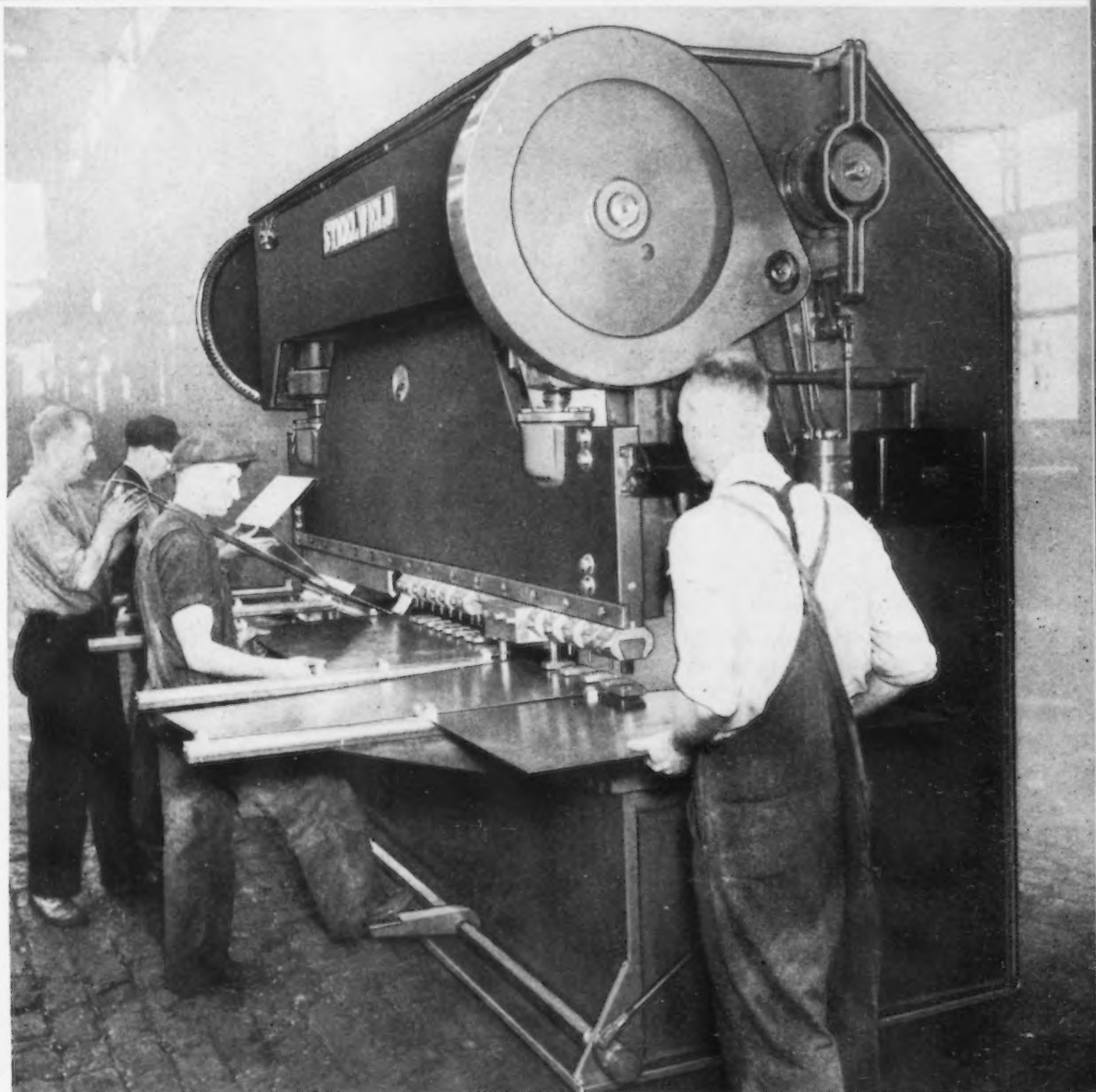
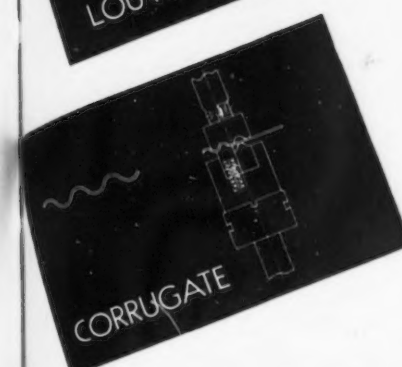
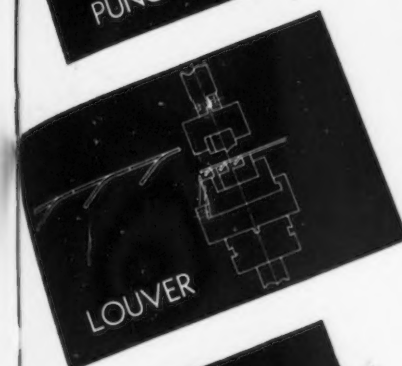
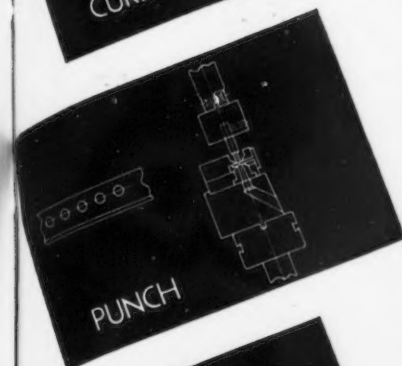
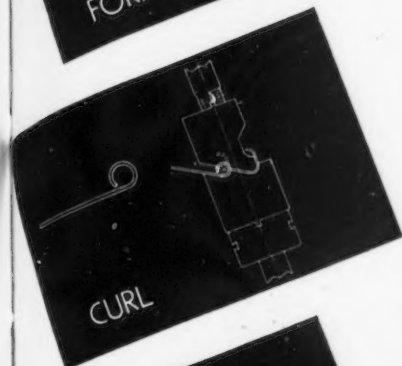
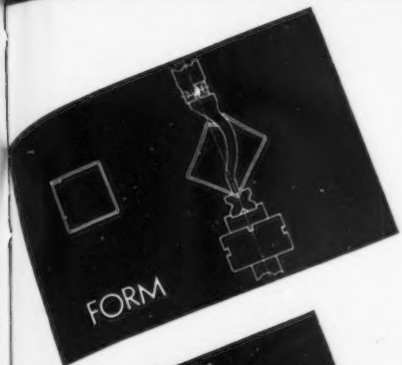
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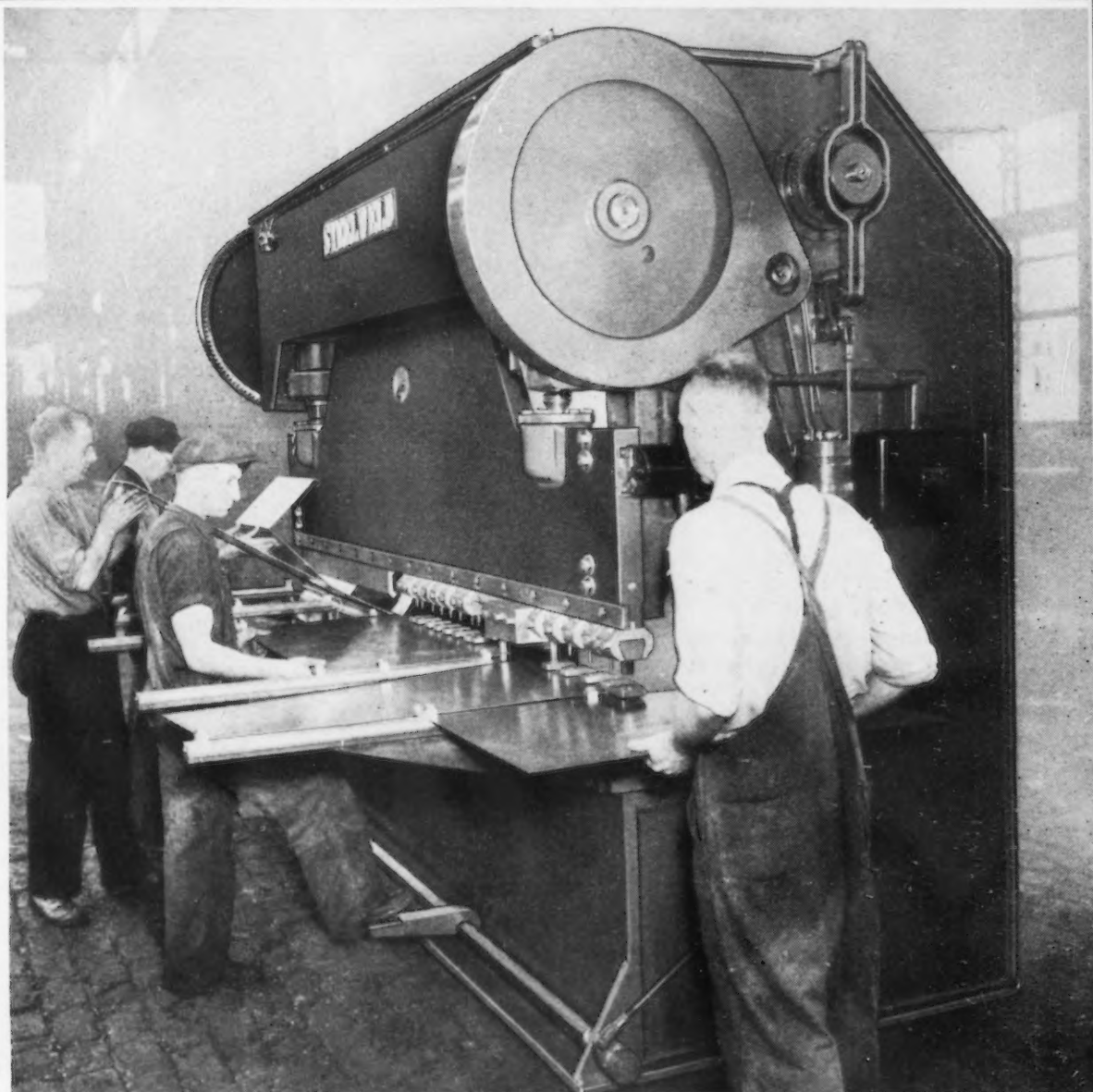
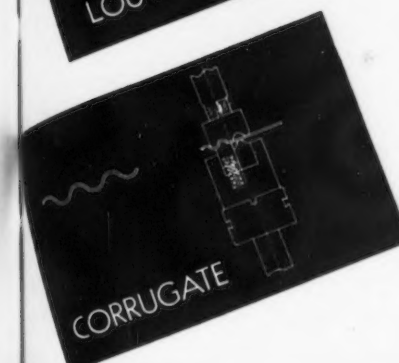
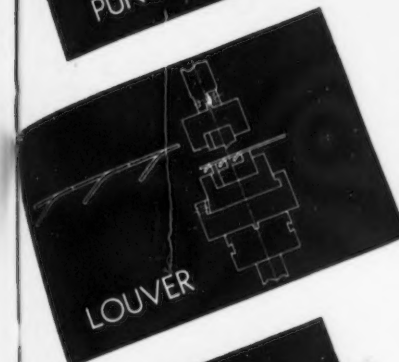
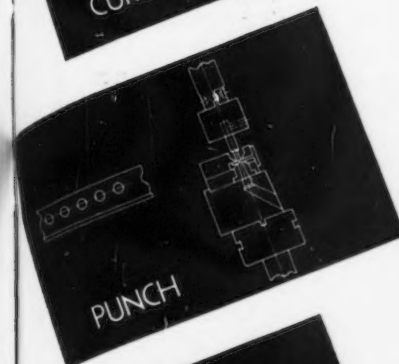
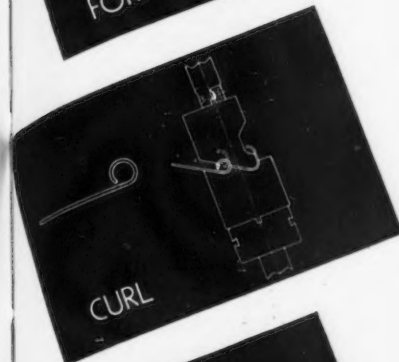
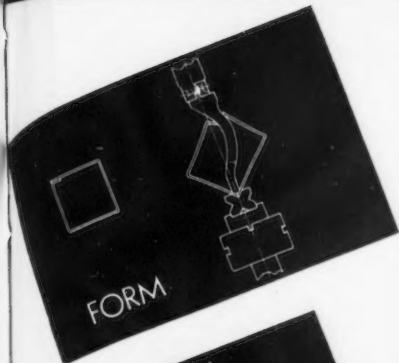
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News of Industry...

Defense Program Won't Elevate Living Standards, Wilson Says

Pittsburgh

••• Since the defense material program is essentially a waste of labor and national resources, it cannot, by any stretch of the imagination, be considered as contributing to elevating the standard of living for people in the U. S., C. E. Wilson, acting president, General Motors Corp., recently told members and guests of the Pittsburgh Men's Clan of the Alumni Federation of Carnegie Institute of Technology.

"It is unfortunate that we now find ourselves forced into such a program which can only be successfully completed by improving the efficiency of all of our activities and by sacrifice on the part of all elements in our country of either some of our material standard of living or some of our leisure," Mr. Wilson added.

"If the program is currently financed by increase taxes and the people of our country are willing to put forth a greatly increased effort, by working longer hours if necessary, and are willing to delay the purchase of certain goods

for their own use while the defense material program is being completed, then we can probably get the job done without sowing the seeds of future depression when this emergency is over," Mr. Wilson said. "But if individuals accumulate increased private debts based on their hope that present high rates of earning power will continue indefinitely, and if at the same time we enormously increase our public debt, and if many of us insist on being paid more for working less, and are unwilling to make the sacrifice required by saving part of our current income to be invested in the defense material

STRUCK PLANT RESUMES: Production at the Vultee Aircraft Co.'s plant at Downey Cal., closed when CIO union heads called 3200 workers out on strike, has begun. Shown here are unfinished army training planes in the Vultee plant. The union allowed army officers to pass through picket lines to take delivery on 17 planes that had been finished.

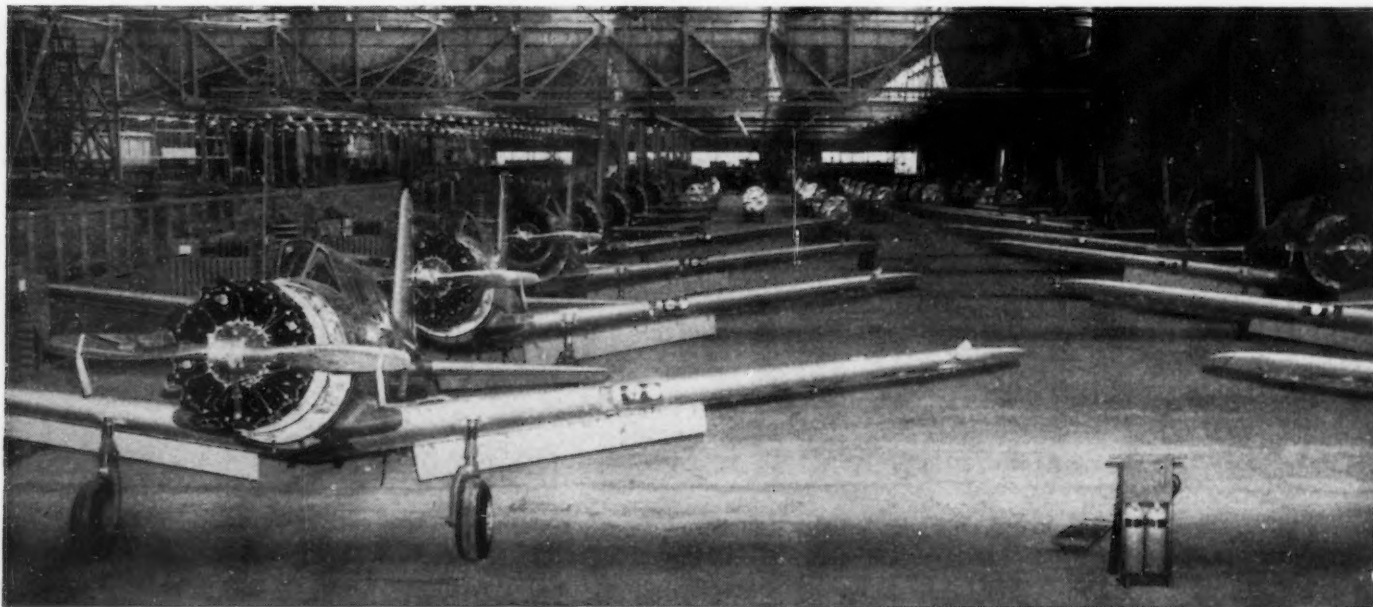
Photo by International

program, then we will face a very serious situation when the defense material program and the emergency are over."

Warning that most of the defense job would have to be done in existing manufacturing cities where managerial talent, technicians and supervision are already available, Mr. Wilson said, "It would seem to me to be a sound program for any corporation in the capital goods industry to plan on taking defense material orders equivalent to 20 or 25 per cent of their normal annual business and make an effort to carry this part of the program. The rest of the increased load such as shipbuilding and aircraft manufacture will have to be carried by new plants and corporations because of the enormous increase in the requirements for those products."

Mr. Wilson warned that it will be months before it will be physically possible to employ people in the actual production of many of these defense materials.

Departing from his prepared talk, Mr. Wilson said the automobile industry was going ahead on plans for 1942 cars as far as the machine tool industry can meet the requirements from the automobile companies.



Canadian Plant To Make Alloy Steel

Toronto

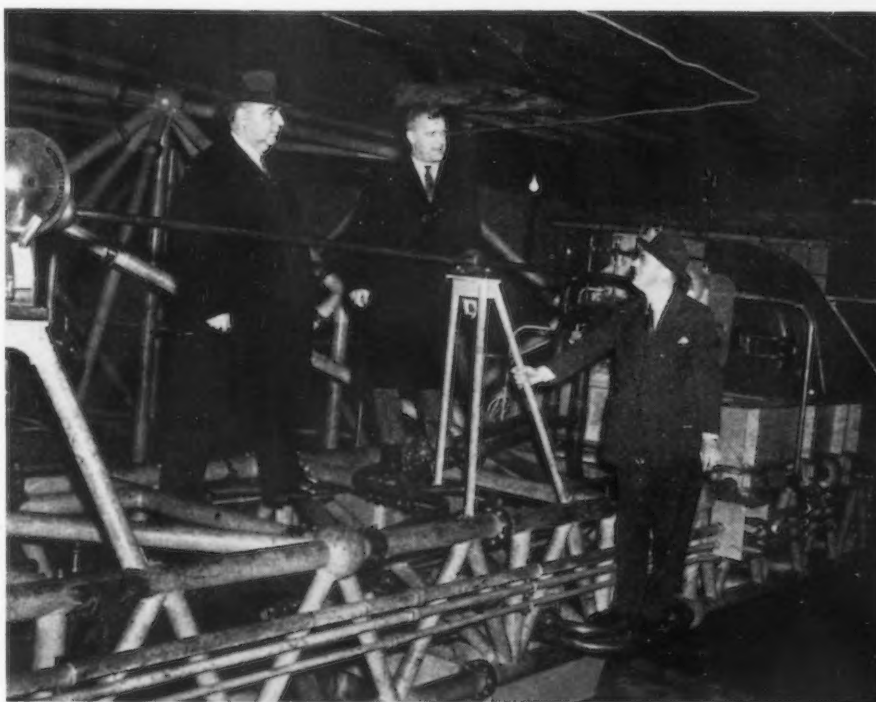
••• Negotiations are underway with the object of opening the London Rolling Mills which will be merged with the Walker Foundry Co., at London, Ont., uniting them in an enterprise for the production of alloy steel. Plans call for installation of new equipment and the remodeled plants to be ready for production in about three months. It is stated that the Morrow Screw & Nut Co., and the Ingersoll Machine & Tool Co., both of Ingersoll, Ont., will take more than 40 per cent of the output. Alloy steel has specially heavy call in the war industries and new sources of production are being provided at several points in Canada.

T. Holmes Bartley, general manager of the Toronto Industrial Commission, stated that two large English companies will establish plants in the Toronto area. The companies are the Self-Priming Pump & Engineering Co., of Slough, England, and the Korect Depth Gauge Co., Ltd., of Croyden, England. The companies manufacture aircraft instruments and special aircraft accessories. The initial plants will comprise approximately 30,000 sq. ft. with provision for additional space as required.

Pickets Follow Company, California to Cleveland

Cleveland

••• When the Jack-Heintz Co., Ltd., airplane accessory manufacturers, moved here recently from Palo Alto, Cal., the A. F. of L. machinists' union resumed picketing which had been started at the former plant. The situation was adjusted when the firm agreed to hire union men upon the start of production. Approximately 300 men are expected to be at work by June 1 on large government defense orders, including an \$808,785 contract for airplane starter assemblies and several million dollars in other defense contracts. William S. Jack is president of the new company.



TOWING CARRIAGE: At the Long Island City, N. Y. plant of Machinery Builders, Inc., this new towing carriage for testing ships is being manufactured for the U. S. Navy. The carriage will soon be shipped in six sections to the David W. Taylor Naval Basin at Carderock, Md. Examining the carriage (left to right) are Starr Truscott, head engineer of the N.A.C.A., Capt. H. E. Saunders, designer, and G. F. Kullack, president of Machinery Builders, Inc.

Photo by Wide World

Alabama Seeks Skilled Men From 18 Crafts

Birmingham

••• Men skilled in 18 crafts employed in national defense industries are being sought by the Alabama State Employment Service for placement in Alabama or neighboring states. Men wanted for placement are sheet metal workers, tool makers, millwrights, tool designers, machinists, punch press operators, milling machine operators, lathe operators, ship carpenters, marine machinists, arc welders, shipfitters, marine pipe fitters, airplane engine mechanics, aircraft instrument mechanics, marine draftsmen, coppersmiths and loftsmen.

Coming Events

Dec. 9 to 13—National Association of Manufacturers, annual meeting, New York.

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Jan. 7 to 9—Institute of Scrap Iron and Steel, Inc., annual convention, Baltimore.

Bolt, Nut, Rivet Output Lower in '39

Washington

••• Manufacturers of bolts, nuts, washers and rivets report that value of products declined from \$98,079,243 in 1937 to \$84,117,969 in 1939, a 14 per cent decrease. Figures supplied to the Bureau of the Census show that the number of wage earners declined from 16,840 in 1937 to 14,331 in 1939 while their wages decreased from \$22,088,126 to \$18,332,950, a 17 per cent drop.

J. & L. Votes \$1 Dividend On Preferred Shares

Pittsburgh

••• The board of directors of Jones & Laughlin Steel Corp., Pittsburgh, at its meeting last week, passed the regular dividend on its cumulative 7 per cent preferred stock but declared a dividend of \$1, or 1 per cent, on account of arrearages in dividends on this stock to holders of record at the close of business, Dec. 9, payable Dec. 23.

Idle Plant List Issued to 500 Firms Holding Defense Orders

Washington

• • • The National Defense Advisory Commission last week mailed to 500 firms working on defense orders a special list of idle plants and equipment to aid defense contractors speed up their deliveries. The list was compiled by the commission's labor division after it completed a survey of so-called

Northwestern Pennsylvania industrial area—heavy tool manufacturer with additional capacity for production of various types of compressor equipment. Also equipped to handle orders for heat treatment of steel for various types of machine equipment.

Close to Pittsburgh district—machine manufacturer with equip-

available except in largest sized plants.

Western Kentucky—well equipped machine manufacturing plant with heat-treating equipment employing about 75 mechanics, including six toolmakers expert on jigs and fixtures, capable of doing high quality precision work. Working one shift, 50 per cent. Excellent transportation facilities by rail or water.

Centrally located in mid-West—group of small shops with variety of tools, including engine and turret lathes, boring mills, drill presses, milling machines, planers and shapers; prepared to pool facilities and execute orders.

The commission's labor division also has available for distribution the first of a series of bulletins on techniques of "farming out" defense orders.

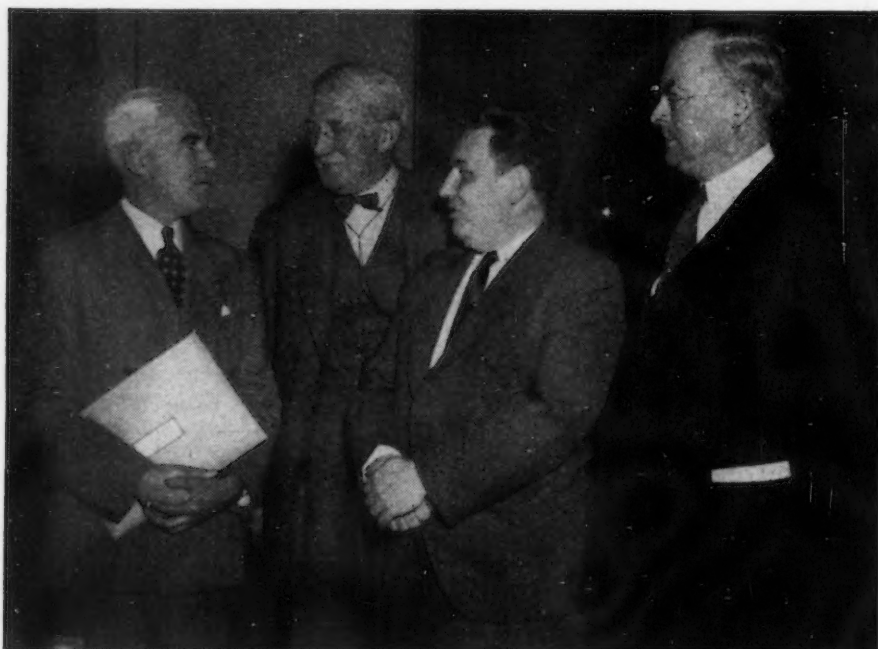


Photo by Harris & Ewing

↑ U. S. PRIORITIES BOARD: Photographed after a Priorities Board meeting to discuss the extent to which military aircraft should take precedence over commercial airline plane production are (left to right) Edward R. Stettinius, William S. Knudsen, Leon Henderson and Donald Nelson, the board's chairman. ↑

"ghost town" areas where, it was found, reservoirs of capable workers are available for handling immediate orders.

This is the partial list of facilities available:

Town in Ohio-Pennsylvania industrial region—400-ton blast furnace; foundry for making ingot molds; tank, tank-car, small stamping, light and heavy machine work plants, operating considerably below capacity. Good transportation facilities.

Ohio-Pennsylvania-Great Lakes region—a rolling mill with available capacity for prompt fabrication of light structural steel of all kinds.

ment and trained workers available for turning out precision machines, including an equipped foundry for small and medium-sized castings.

Industrial county in Western Pennsylvania (population 165,000)—owners of plants with considerable machine-tool capacity have pooled all facilities and, working as a single plant, are prepared to execute orders for the Government and Government contractors.

Large mid-Western city—group of manufacturers with machine tools and equipment of all descriptions are pooling facilities, thereby providing equipment not generally

Superior Shipbuilding Co. Organized in Wisconsin

Superior, Wis.

• • • The Whitney shipbuilding properties have been purchased for \$75,000 from Merritt Chapman Scott Corp., New York, by a group of Superior business men headed by Fred Russell. The new organization will be known as the Lake Superior Shipbuilding Co. Hugh I. Russell, prominent building contractor, will be in charge. Plans call for modernizing and equipping the property for the construction of various types of ships under the national defense program. The old company did considerable building during the last world war.

Gonda Engineering Co. Organized in Ohio

Salem, Ohio

• • • Formation of the Gonda Engineering Co., with offices and shops in the old Jessup pattern works, is announced by John H. Gonda, who recently resigned as chief engineer at the Mullins Mfg. Corp. The firm will specialize in the manufacture of dies for the automotive industry, and will make tools, jigs, fixtures and do general machine work.

Scrap Exports Rise 3318 Tons in October

Washington

• • • Exports of scrap in October totaled 258,926 gross tons, an increase of 3318 tons over September, according to preliminary figures of the Metals and Minerals Division, Department of Commerce. Old material exports in October last year were 336,775 tons. For the first 10 months of the current year scrap exports were 2,678,759 tons compared with 3,098,369 tons in the corresponding period of last year.

Exportation of all grades of scrap became subject to license

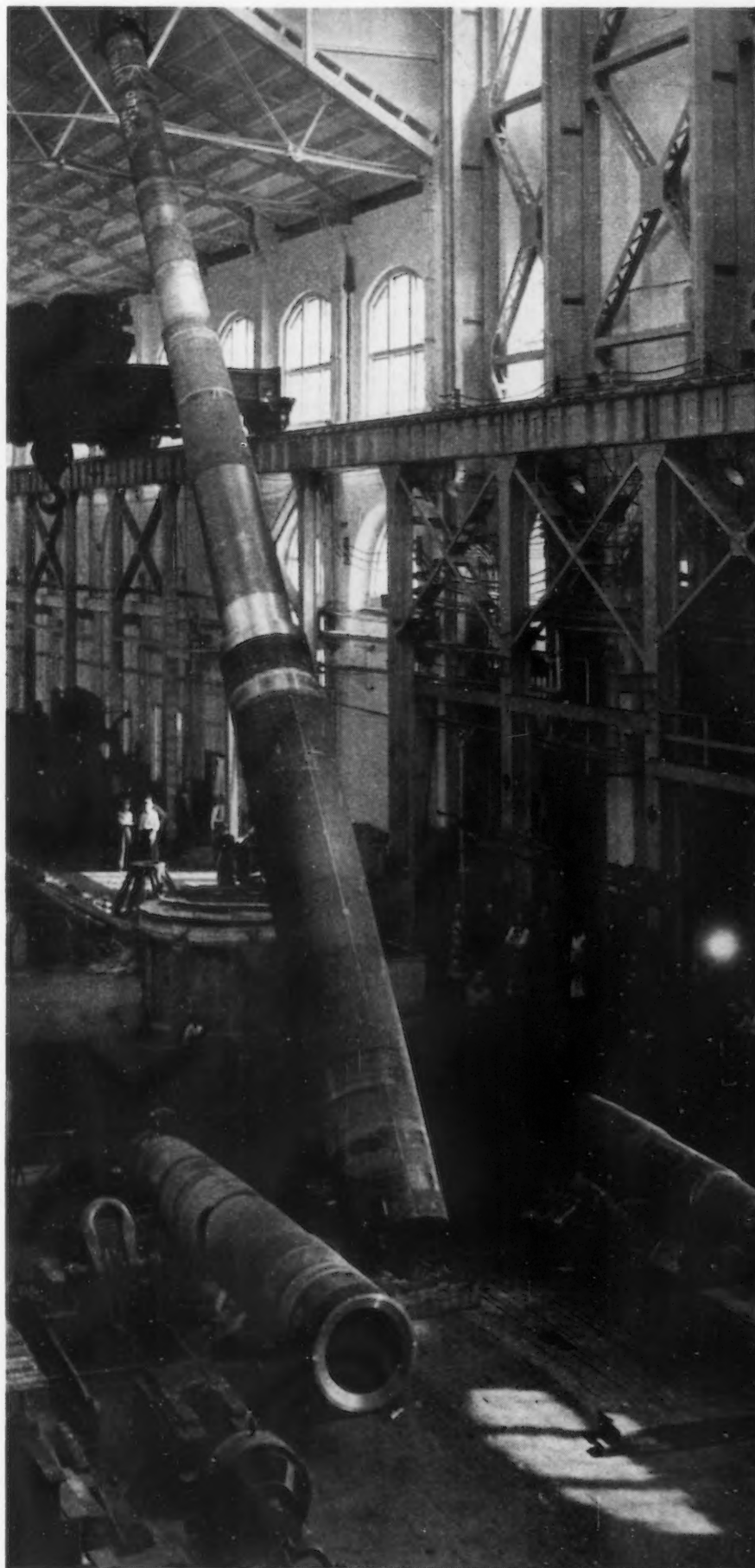
NO TRESPASSING: Giant guns like the one pictured here being made at the Watervliet, N. Y. arsenal are rapidly being added to the nation's defense equipment. The hoop shown on the floor to the left of the breech will be slipped over the muzzle and shrunk into its proper place.

Photo by International

on Oct. 16 with the further qualification that the issuance of such licenses would thereafter be limited to shipments moving to countries of the Western Hemisphere and to Great Britain. Hence shipments outside this area cover only exports extending through Oct. 15.

Shipments for this 15-day period are reported to have been made as follows: Japan 147,708 tons; Spain 9176 tons; China 227 tons; British India 118 tons; and Iraq 75 tons. The figures for the entire month were: United Kingdom 55,098 tons; Canada 44,205 tons; and Mexico 1875 tons.

Included also in the October total was 324 tons of tin plate circles, etc., of which China took 274 tons and Greece 50 tons, while 120 tons of waste-waste tin plate went to Hong Kong.



Defense Board Sets up Group to Stabilize Shipyard Employment

Washington

• • • A shipbuilding committee to survey means of stabilizing employment in shipyards has been designated by the National Defense Advisory Committee. Composed of representatives of the industry, labor and government, the committee will hold its first meeting in Washington on Dec. 5.

Defense Commissioner Sidney Hillman, who as head of the commission's labor division announced appointment of the committee, said that a committee similar in personnel and purpose will soon be established for the aircraft industry.

Expected to undertake a detailed investigation of wage rates, working conditions placing particular emphasis on the migration of workers from yard to yard and the

resultant effect on production, the shipbuilding stabilization committee will survey shipyard "zones" that will form a basis for recommendations to be placed before the defense commission. Its job is to suggest a labor program which can insure the most efficient construction of ships needed under the defense program.

Personnel of the committee includes:

Representing the industry—Gregory Harrison, for Pacific Coast shipyards; F. A. Liddell, for Gulf Coast shipyards; Prof. H. L. Seward, for North Atlantic and South Atlantic Coast shipyards; H. Gerrish Smith, for Great Lakes shipyards.

Representing labor — Harvey Brown, president, International Association of Machinists; John

P. Frey, president, AFL's Metal Trades Department; John Green, president, and Philip H. Van Gelder, secretary, Industrial Union of Marine & Shipbuilding Workers of America.

Representing the government—Admiral Emory S. Land, chairman, Maritime Commission and Joseph W. Powell, special assistant to the Secretary of the Navy Frank Knox.

Morris L. Cooke, former REA administrator and industrial engineering consultant, will act as chairman.

Steel Spring Production Showed Decline in 1939

Washington

• • • Decreases in production, employment and wages in 1939 as compared with 1937 are reported by manufacturers of steel springs, except wire, in figures released by the Bureau of the Census. Value of products declined from \$27,233,204 to \$23,044,252, number of employees decreased from 3902 to 2923 and their wages fell from \$5,803,978 to \$4,277,439.

The industry, which for census purposes covers plants primarily engaged in the manufacture of leaf springs and hot-wound springs for railway equipment, vehicles (excluding automobile springs), agricultural and mining equipment, numbered 57 establishments in 1937 and 53 in 1939. It does not include springs made by plants which also operate rolling mills.

Census Shows Output of Safes, Vaults Up in 1939

Washington

• • • Manufacturers of safes and vaults are reported by the Bureau of the Census to have enjoyed moderate increases in production, employment and wages in 1939 over 1937. While the number of establishments increased from 14 in 1937 to 16 in 1939, the value of products rose from \$1,997,640 to \$2,413,251; number of wage earners increased from 1132 to 1236 and their wages increased from \$1,445,413 to \$1,589,088.

You Can Depend On "HERCULES" (Red-Strand) Wire Rope...

There is no guesswork when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. Furnished in a wide variety of constructions so as to be suitable for all purposes—each backed by 81 years of manufacturing experience and close co-operation with users.

—PREFORMED—

For maximum efficiency in Preformed Wire Rope, use Preformed "HERCULES". It is available in both Round Strand and Flattened Strand constructions.

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Established 1857

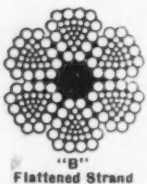
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New York . . . 90 West Street
Chicago . . . 810 W. Washington Blvd.
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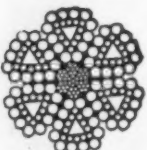
San Francisco . . . 520 Fourth Street
Portland . . . 914 N. W. 14th Avenue
Seattle . . . 2244 First Avenue South



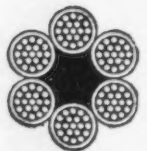
Style B
Flattened Strand



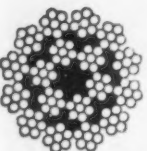
"B"
Flattened Strand



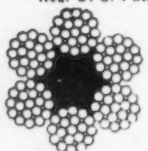
Wire Rope Center



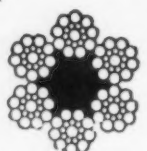
Steel Clad



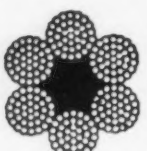
18x7
Non-Rotating



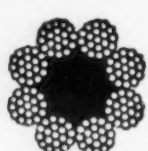
6x19
Filler Wire



6x19
Scale



6x37
Extra Flexible



8x19
Extra Flexible

MCKAY HEAVY DUTY ROLLER LEVELLERS

MckAY Heavy Duty Roller Levellers are specially designed for heavy work such as light armor plates for tanks.

They are furnished to level various widths and thicknesses of all kinds of plate.

Give us your requirements and we will submit specifications for the size and type of Leveller you need.



The **MCKAY MACHINE** *Company*
ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT
YOUNGSTOWN, OHIO
ASSOCIATED COMPANY
The WEAN ENGINEERING CO., Inc. • WARREN, OHIO



↑ **WORLD'S FASTEST:** The P-38 Lockheed interceptor, claimed to be the world's fastest airplane, is photographed from the air for the first time. Mass production of the 400 mph.-plane for the U. S. Army and the R.A.F. is planned by next spring. ↑

Photo by International

SUPERIOR
Checker Coat
STEEL SHEETS

This modern sheet combines a distinctive style and pattern with the well-known quality of SUPERIOR GALVANIZED. Other Superior Coated sheets include Superior Galvannealed, Commercial Quality, Copperior, "Super Metal," Tite and Extra Tite Coats, etc.

THE SUPERIOR SHEET STEEL CO.
CANTON, OHIO
Division of Continental Steel Corp., U.S.A.

THE SUPERIOR SHEET STEEL CO.
TRADE MARK
CHECKER COAT
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- CANTON, O.

Metal Beer Containers 776,021,878 Last Year

Washington

• • • The growing use of metal containers for beer is reflected in the Bureau of the Census report showing that the 1939 output for that purpose rose to 776,021,878 cans, valued at \$18,600,944 compared with 630,896,567 cans, valued at \$14,108,829 reported for 1937.

Though continuing to be far in the lead in output, the number of sanitary cans produced in 1939 declined to 8,642,703,557, valued at \$151,938,475 from 9,592,242,879 cans, valued at \$168,932,899, produced in 1937.

For the first time the census reported separately the output of terne plate oil containers with a value of \$14,583,497 last year. There was a moderate drop in the output of ice cream and a sharp decline in the production of dairy milk cans last year as compared with the earlier year. There were 931,721 milk cans, valued at \$387,195, produced last year as against 999,505, valued at \$535,873 in 1937. Dairy can production last year totaled 1,094,020, valued at \$3,564,601, compared with 1,575,277, valued at \$5,040,856 in 1937. General line cans to the value of \$122,536,449 were produced in 1939 compared with \$130,367,606 in 1937. The census report said that terne plate oil containers "probably" were included in "general line cans" in 1937.

The total value of the output of tin cans and tin ware "not elsewhere classified" in 1939 was \$372,616,014, an increase of 3.9 per cent compared with \$358,796,041 reported for 1937.

Glass Industry Patent Agreements May End

Toledo, Ohio

• • • The glass container industry is reported to have agreed to dissolve patent agreements which government prosecutors contended were monopolistic. Attorneys worked out a plan for a central organization which would hold basic patents and keep them available to new manufacturers at the same cost paid by organization members.

MEMO

FROM THE OFFICE OF THE PRESIDENT

Jim -
I suggest you consider Copperweld
Steel, Warren, Ohio, for a part of our
alloy steel requirements.
I understand they have a fine
bunch of experienced steel makers
working in a new plant built solely
for the production of alloy steels.
Let's give them a trial -
I'd like to find out if they're as
good as I've heard they are.
W. F.

ARISTOLOY
STEELS

ARISTOLOY STEELS

S.A.E. ALLOY BILLETS AND BARS; OXIDATION AND CORROSION RESISTING STEELS;
TOOL AND SPECIAL STEELS; AIRCRAFT QUALITY STEELS; STAINLESS STEELS

COPPERWELD STEEL COMPANY · WARREN, OHIO

Defense Construction Program so Far Takes \$240 Millions of Steel

Washington

• • • Figures released by the National Defense Advisory Commission show that the value of iron and steel products covered by sub-contracts already placed or being negotiated under the \$2,000,000,-

000 defense construction program total \$240,000,000. Iron and steel products lead in the material orders expected to total \$1,000,000,-000 under the program.

Covering the construction of living quarters, air and naval sta-

tions, plant facilities for manufacturing aircraft, tanks, ammunition and other military supplies, shipyards, the program involves defense construction up to June 30, 1942.

Other material order estimates by the commission experts include \$140,000,000 for lumber and mill work; \$175,000,000 for brick, hollow tile and cement orders; \$80,000,000 for sand, gravel and crushed stone; \$80,000,000 for other materials requiring factory finishing, heat and ventilation materials; \$65,000,000 for plumbing materials; \$40,000,000 for electric wiring and fixture orders; and



The OHIO 36" SUPER-DREADNAUGHT Shaper has the power and capacity required for the severe service of machining die blocks, steel forgings and large castings.

Table size—30" wide x 49" long.

Ram bearing—56" long x 15" wide.

Ram—80" long.

Can be equipped with drop table and all other attachments.

THE OHIO MACHINE TOOL CO.

KENTON, OHIO

MANUFACTURERS OF

SHAPERS, OHIO DREADNAUGHT PLANERS
HORIZONTAL BORING, DRILLING and MILLING MACHINES

Bob Hope, Comedian, Expands Metal Firm

Cleveland

• • • IF BOB HOPE, radio and screen star, becomes more gleeful than ever, it may be because Hope Metal Products, Inc., is expanding here. The company, incorporated only a few months ago, has taken a five-year lease on two floors of a four-story building here, with option on the other floors. The space is 20,000 sq. ft., about eight times the former space. Bob Hope is board chairman and his brother, Ivor, is president of the concern, which makes hollow metal doors, metal cabinets, furniture and other items.

\$7,000,000 for non-ferrous metals and their products.

An estimated \$600,000,000 will be spent for wages on construction sites in 48 states and territorial defense outposts in Alaska, Caribbean Islands and the Pacific. Total construction site employment is estimated at over 730,000,-000 man-hours during the next 16 months.

National Acme Has \$15,000,000 Backlog

Cleveland

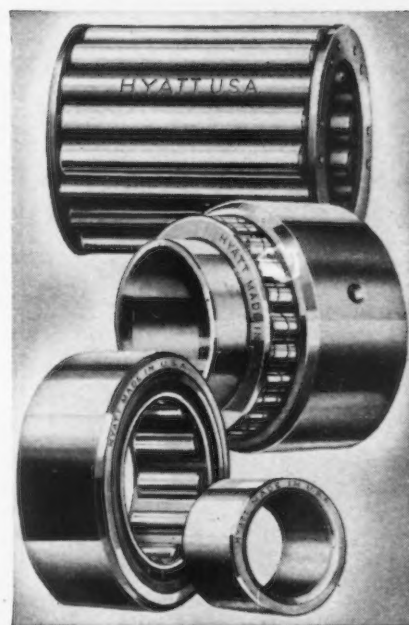
• • • Directors of the National Acme Co. here have declared a dividend of 50c. a share on common stock, payable Dec. 16 to stockholders of record Dec. 6. Fred H. Chapin, president, revealed that the company's backlog of orders approximates \$15,000,-000, an unprecedented total for at least the past 20 years.

Smoothing THE WAY



This Lift Jack, built by the BOND FOUNDRY and MACHINE CO., MANHEIM, PA., like their well known line of truck casters and wheels, employs Hyatt Roller Bearings for frictionless operation and longer life.

HYATTS ROLL MERRILY ALONG carrying heavy loads ...eliminating bearing wear and care, keeping shafts, gears and wheels in perfect alignment ...and making life easy, *and long*, for machinery and material handling equipment of every make and kind. Everywhere, Hyatt Roller Bearings are smoothing the way. Design them into the machines you build; look for them in the equipment you buy. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.



HYATT

R O L L E R B E A R I N G S

Q U I E T

Trade Notes

Negotiations for the sale of the Superior Iron Works, 302 Grand Avenue, Superior, Wis., to the Lidgerwood Mfg. Co., Elizabeth, N. J., are reported to be virtually completed and official announcement is expected soon. According to local officials, the new owners have plans for an expansion program. E. H. Williamson is president of the Superior Iron Works, F. R. Zimmerman is vice-president and C. T. Gray secretary and treasurer. The company manufactures marine, mining and railroad machinery and operates a foundry in connection with its production program.

A new corporation, with \$40,000 capital, headed by C. R. Pieper, president of the Iron Products Corp., LaCrosse, Wis., will manufacture bicycles and power bikes and is expected to begin production of the first 250 units within 30 days. E. R. Stone, St. James, Minn., bicycle inventor, is vice-president and general manager. The power bicycle will be designed for delivery use and material is now on order for 200 pedal bicycles and 50 power models. The former Automotive Foundry, Gillette and Rose Streets, will house the project.

Sundstrand Machine Tool Co. and its subsidiary, the American Broach & Machine Co., reported consolidated net for nine months of \$688,140, after provision for federal normal and excess profits taxes now in effect, equal to \$5.48 a share on 125,419 shares of capital stock. No comparison with like period of last year is available.

Acme Steel Co. reports earnings of \$1.84 a share for the September quarter compared to \$1.35 a share for the same quarter a year ago. Nine months net profit of \$1,648,091 or \$5.03 a share compare with \$1,042,825 or \$3.18 a share in 1939.

Detroit Rex Products Co., manufacturer of degreasing machines, solvents, industrial alkali compounds and dry cleaning equipment, has moved its Chicago office to larger quarters at 1166 West Cermak Road.

A. O. Smith Corp. and wholly owned subsidiary showed net profit of \$1,686,681, equal to \$3.38 a share of 498,880 shares of capital stock.

Whiting Corp., Harvey, Ill., announces the appointment of Shirley, Olcott & Nichols, as its Washington sales representatives to look after government work. The firm has offices at 202 Mills Building, Washington, D. C.

Mount Vernon Foundry Co., Grand Rapids, Mich., has been incorporated and will produce aluminum and non-ferrous castings.

Flame Treating & Engineering Co., with L. T. Benoit, formerly district engineer of Linde Air Products Co., as engineer, has opened a custom plant at 181 Homestead Avenue, Hartford, Conn.

American Air Filter Co., Louisville, Ky., announces there has been no change in ownership, management or field representation of the company, which will continue to function as an entirely independent organization.

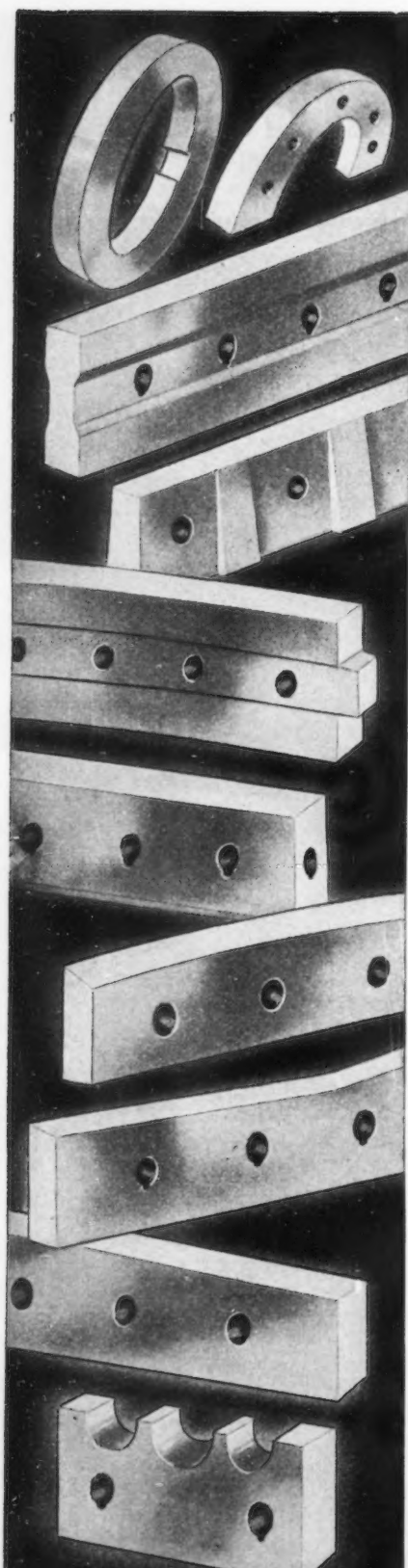
Lakeshore Machinery & Supply Co., Muskegon, Mich., will move about Dec. 1 into a building acquired recently from the Brunswick-Balke-Collender Co.

Lake Superior Shipbuilding Co., Superior, Wis., has been organized with 500 shares at \$100 each by D. A. Rock, V. B. Fisher and J. Dixon.

Toledo Steel Products Co., Toledo, Ohio, has moved its sales division to enlarged office quarters on the 20th floor of the Second National Bank Bldg., according to J. E. Adams, general sales manager.

Pittsburgh Plate Glass Co., Pittsburgh, has awarded contract to H. K. Ferguson Co., Cleveland, for an addition, 100 x 100 ft., to its warehouse at Clarksburg, W. Va.

Link-Belt Co. and subsidiaries earned a net profit of \$1,780,740 for the first nine months of 1940, equal to \$2.37 a share.



Greater Tonnage
Per Edge of Blade

A

**AMERICAN
SHEAR KNIFE CO.**
HOMESTEAD · PENNSYLVANIA



TANK TRACK BLOCKS—Contracts for rubber track blocks to be used on light combat tanks like that shown here have been awarded Goodyear Tire & Rubber Co. by American Steel Foundries, American Car & Foundry Co. and the Rock Island Arsenal. Production is expected to begin within a few weeks.

Canada's Steel Output Tops 92%

••• Canadian steel plants, operating at 92½ per cent of capacity during October produced 185,091 long tons of ingots and direct steel castings, the highest monthly total in the history of that country's industry. October volume was 13 per cent higher than the 164,515 tons produced in September, and 24 per cent higher than October, 1939, when the output was 149,890 tons. The month's total included 179,137 tons of ingots and 5954 tons of castings.

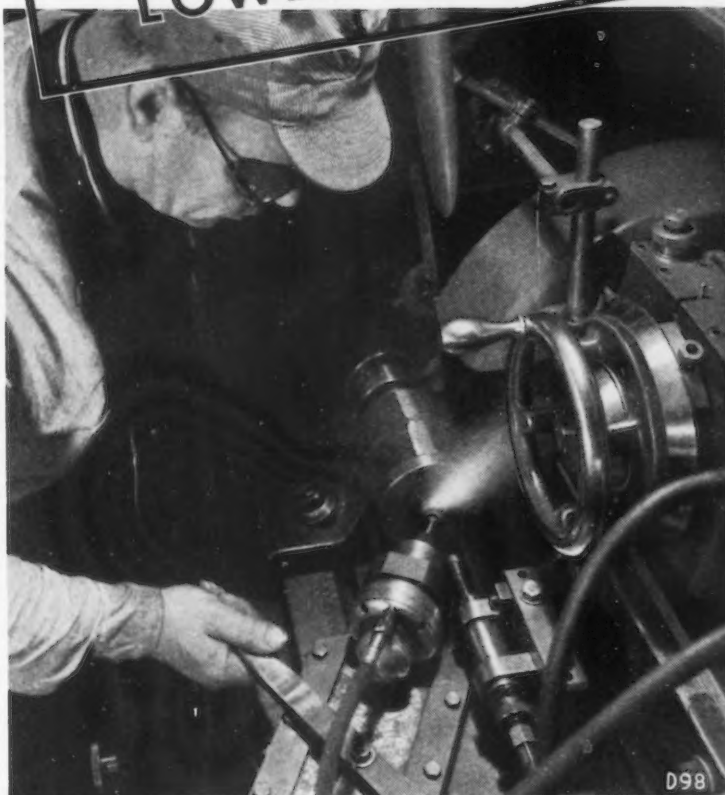
Average rate of output for the year to date is at an all-time high, being 165,000 tons a month, 19 per cent higher than that for the 12 months of 1918, war year and previous high, when monthly output averaged 139,000 tons. Cumulative production through October of the current year was 1,649,639 tons, 52 per cent more than the 1,087,538 tons produced in the first 10 months of 1939.

Blast furnaces in October turned out 109,385 tons of pig iron, an increase of 4 per cent over September output of 105,020 tons, and less than 3 per cent under the all-time high of 112,528 tons, established in August, 1929. Production for the month included 84,617 tons of basic, 13,368 tons of foundry iron, and 11,400 tons of malleable iron. All of the foundry and malleable iron as well as about 7 per cent of the basic were produced for sale. Of 10 stacks, nine were active, with a total daily output of 3825 tons.

Iron production for the 10 months ended October, 1940, totaled 948,841 tons, 65 per cent heavier than the same period in 1939, when 573,740 tons were produced. Basic production in 1940 comprised 83.3 per cent of the total, as compared with 87.7 per cent in the corresponding period of 1939. Foundry iron output remained about the same at 9.3 per cent of the total, while malleable rose to 7.4 per cent from 2.9 in 1939.

Production of ferro-alloys climbed to 15,016 tons in October, and was 14 per cent higher than the September output of 13,147 tons, constituting an increase of 136 per cent over October, 1939.

HOW 30 MINUTES LOWERS COSTS



Thirty minutes can mean a considerable amount of money when calculated in terms of manufacturing production time.

For instance, at Delta Manufacturing Company in Milwaukee, Wisconsin, a standard Landis 6" Type C Plain Hydraulic Grinder is lowering costs by requiring less than 30 minutes to switch over from a regular external set-up to a special two spindle internal fixture and work holding device. With this equipment the bore and chamfer of very small spindles are economically ground.

Since only about one-tenth of their grinding requires the special set-up, the same machine can be profitably utilized for the small spindle operations and numerous between center external operations.

351



LANDIS TOOL CO.

WAYNESBORO • PENNSYLVANIA

ANNOUNCING

The NEW Allis-Chalmers
Electrifugal Pump with

... *new extra*
value features at
no extra cost!



ALLIS-CHALMERS *Electrifugal*

ING!

Here Are Engineering Advancements That Mean More Gallons... At Less Cost to You!

- 1** All-in-One... Motor and Pump Designed as Unit on One Shaft and One Housing... Increases Compactness... Adds to Flexibility.
- 2** Allis-Chalmers Lo-Maintenance Motor... Developed Especially for This Work... Gives Maximum Pumping Efficiency at Lowest Power Cost... Built with Cast Iron Frame for Special Applications in Chemical Industry.
- 3** Splash-Proof Features... with Air Passages Baffled... Safeguard Motor from Liquids.
- 4** Fewer Parts to Wear... Better Fit to Parts Because of Fewer Machine Joints... Adds to Long-Life, Low-Cost Operation.
- 5** Indestructible Rotor... Distortionless Stator... Bronze Fitted Pump Parts... Large Space Provided for Adjusting Glands... and Other Features Assure You Improved Performance.
- 6** Greater Stability and Rigidity of All-In-One Design... Means Less Vibration... Lower Maintenance... Longer Life.

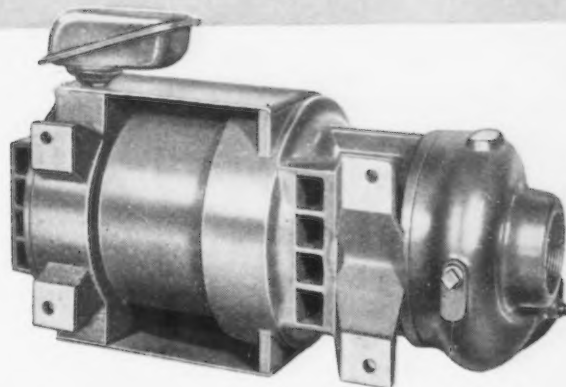
THESE ARE ONLY a few of the great features that have been made a part of the new all-in-one Electrifuhal Pump by Allis-Chalmers engineers... the same trail-blazing engineering that designed and built the gigantic Niagara Falls and Boulder Dam turbines... that originated the motor-coupled pump in 1926!

Here, in one unit, is the pump and motor combination you've been looking for... modern in appearance... ready to give you more gallons per dollar of power cost.

So before you buy... get the whole story of the new Allis-Chalmers Electrifuhal Pump. Find out how well it fits into your present set-up... how it can save you money. Best of all — learn how you get these *extra-value* features at *no* extra cost.

Call the nearest Allis-Chalmers district office... or write Allis-Chalmers, Milwaukee... today!

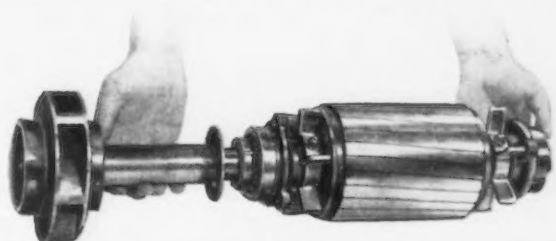
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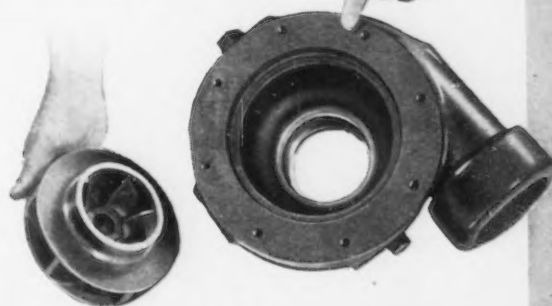
IN THIS UPSIDE-DOWN VIEW OF THE Electrifuhal Pump, see how the air goes in and out through large air passages, keeping the motor cool at all times.



THIS DISTORTIONLESS, REMOVABLE Stator is one of the many outstanding features of the Allis-Chalmers Lo-Maintenance Motor used as integral part of the Electrifuhal Pump.



INDESTRUCTIBLE ROTOR IS on the same shaft with pump runner — making a single unit of pump and motor... with lower maintenance and longer life.



THE ALLIS-CHALMERS ELECTRIFUGAL Pump has bronze runner wear rings, water seal ring, and shaft sleeve... has been designed to deliver maximum gallons at minimum cost.

PUMP *Cuts your Pumping Costs!*

I BUY ON
QUALITY AND PERFORMANCE

I BUY ON PRICE

We both get
what we want in
PARKER-KALON
Cold-forged Products

MANUFACTURED by an improved process developed by Parker-Kalon, these superior *cold-forged* Socket Screws, Wing Nuts, Cap Nuts and Thumb Screws excel in the accuracy, uniformity and strength that critical users insist on. And yet, because of Parker-Kalon's unmatched production facilities, they *cost no more* than ordinary products! Write for free samples and prices. No obligation.

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200-202 Varick Street New York, N.Y.



PARKER-KALON
Cold-forged
SOCKET SCREWS WING NUTS
CAP NUTS THUMB SCREWS

SOLD ONLY THROUGH REPUTABLE DISTRIBUTORS

Defense Is Theme For Congress of Industry

New York

• • • Some of the country's leading industrialists and economists will meet for discussions during the forthcoming Congress of American Industry at New York, it has been announced by the National Association of Manufacturers, sponsors of the congress.

With "Total Preparedness For America's Future" as a theme the Congress, beginning Dec. 11 at the Waldorf-Astoria Hotel, one session will be devoted to production aspects of the defense program—an analytical study of the problems facing America's industries on the production line and the efforts being made by production experts to "short-cut" any possible bottleneck.

Bendix To Make Plane Struts, Carburetors

Detroit

• • • Bendix Aviation Corp., which recently leased the entire Wayne (Mich.) plant of the Graham-Paige Motors Corp., for the production of defense materials, will manufacture aircraft carburetors and landing gear struts, it has been learned. The plant is partly tooled now and further equipment is being added so production can get under way in early spring. Initial output probably will be in February, with 300 carburetors scheduled for March. The plant will employ 1500 workers. Offices at present are at 8-202 General Motors Building.

635 Defense Contracts Awarded at Chicago

Chicago

• • • Through mid-November 635 defense contracts, valued at \$243,201,000, had been awarded to companies in this area. Nearly 300 firms, some with as many as five or more primary contracts, have participated in the business so far. This does not include the subcontractors who have received an estimated \$25,000,000 of business indirectly from the defense program. According to the Chicago Association of Commerce, about \$60,000,000 of steel and iron is being produced each month in this area.



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Westinghouse To Build Gun Equipment Plant

Washington

••• Westinghouse Electric & Mfg. Co., Pittsburgh, will construct and operate a new \$5,000,000 naval gun equipment plant at Louisville, Ky., for assembling parts from ordnance plants and other manufacturers. Selection of the site, the Navy Department said, was determined on a basis of availability of skilled machinists and assemblers for precision machining and fitting of naval ordnance parts.

The new gun equipment plant, to consist of main manufacturing buildings, office building, heating plant and service building, will be constructed and operated under the leasing arrangement adopted by the Westinghouse company's recently created Emergency Products Division. The Navy will pay for the plant and equipment which will be designed for mounts, turret items, gun slides, recoil mechanism, breech housings and breech blocks.

The Navy said that production orders for naval gun equipment will be assigned to the new Louisville unit on a basis similar to assignments at the naval gun factory in Washington. Upon the completion of assembly work on parts received from other ordnance and private plants, the guns and mounts will be proof-fired at a nearby proving ground and later shipped to naval vessels for installation.

The new plant will occupy 135 acres on the Ohio River near Louisville where, the department said, adequate transportation facilities are available. Approximately 1000 skilled workers will be employed.

Savanna Ordnance Depot Awards Power Contract

Savanna, Ill.

••• Construction of a diesel electric generating plant at the Savanna ordnance depot will be undertaken by Chicago Pneumatic Tool Co., lower of two bidders. The plant is to be located on the lower post grounds and will provide power and lighting for the entire proving ground. At present, the post gets its power from the Savanna utilities system.

ARE YOU DOING YOUR PART?



Are you participating in our Defense Program?

Do you have facilities in excess of that required for your normal work?

Would you be willing to operate your plant for longer hours and take on defense work?

Is your personnel capable of, and in position to handle, additional work?

Are there unemployed people in your community who could be trained in your type of production?

Do you have sufficient facilities that would enable you to accept a contract direct for the manufacturing of some article needed in our Defense Program?

Would you be willing to act as a subcontractor in the manufacture of parts?

* * *

If you're not now participating in our Defense Program and have available facilities, why not contact your local district Ordnance Office and make known your available facilities and your willingness to be of assistance.

America's Defense Program calls for the complete utilization of existing facilities and man power.

Geo. P. Trundle Jr.

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General Offices at HOLLY, MICHIGAN
Manufacturing Plants at Holly, Michigan and Belding, Michigan

October's Machinery Exports \$43 Millions

••• Exports of machinery from the U. S. during October reached the record value of \$43,567,434, surpassing by nearly \$2,000,000 the previous high established in December, 1920, the Machinery Division of the Department of Commerce reports. All the major machinery classes shared in the gains, but shipments of power-driven metal working machinery showed the largest increase, rising to the record value of \$26,798,995.

Machine tool exports to England, amounting to \$19,902,633 as against \$15,070,249 in September, accounted for the greater part of this total; comparable shipments to Russia decreased to \$130,599 from \$894,999 in the preceding month, while consignments to Japan valued at \$1,393,434 showed a gain over the September figure of \$587,632. Shipments of machine tools to Canada have increased sharply in recent months. Valued at \$635,322 in July, they advanced to \$1,582,273 in August, to \$2,181,304 in September, and to \$2,678,330 in October.

Total October exports of power-driven metal working machinery were nearly 20 per cent above the September figure. Shipments of lathes rose to \$6,947,124 from \$3,881,912 in the preceding month; exports of milling machines came to \$4,917,159 as against \$4,681,477 in September; grinder shipments totaled \$4,639,305 compared with \$3,117,510 in the preceding month. Drilling machine exports valued at \$1,329,796 showed a slight decline from September figure of \$1,393,994, while shipments of rolling mill equipment dropped to \$368,777 from \$1,100,016 when consignments to Russia, the chief purchaser of this equipment in recent months, fell to a negligible figure. Exports of metal working machinery, other than power-driven, were valued at \$811,255 compared with \$750,880 in September.

October exports of mining, well, and pumping equipment totaled \$3,491,008, a gain of 8 per cent over September shipments valued at \$3,220,322. Pumping equipment showed the greatest relative increase, rising to \$830,043 from \$646,992.

A 33 per cent gain was recorded for shipments of construction and

conveying equipment, which reached \$2,750,359 in October as against \$2,075,348 in the preceding month.

Power - generating machinery valued at \$1,895,921 was shipped from the United States in October, an increase of nearly 20 per cent over September exports amounting to \$1,588,044.

United to Build Huge Armor Plate Press

Youngstown

• • • A new building will be erected by United Engineering & Foundry Co. here and new equipment will have to be secured before construction of a giant forging press awarded the company by the Navy Department can be started. The press is destined to forge heavy armor plate and will have a ram exerting 14,000 tons pressure. The tie rods of the press will be 40-in. in diameter and will weigh when finished about 100 tons each, while some of the castings will weigh as much as 150 tons each. The press will stand 80 ft. high.

Stran-Steel Gets Navy Contract for 3000 Homes

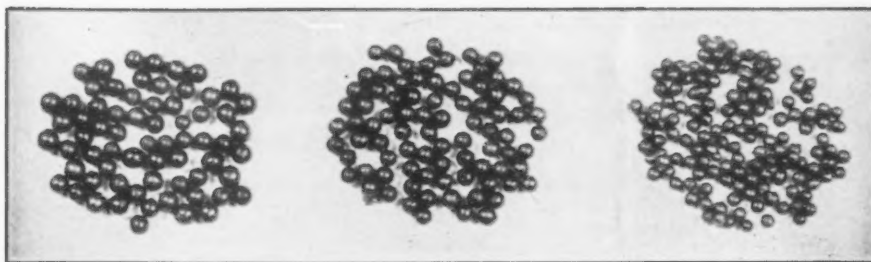
Detroit

• • • Stran-Steel Division of Great Lakes Steel Corp. has been awarded three contracts for erection of 2100 homes for men in the United States Navy. These orders followed completion of the first 50 low-cost houses built by the Navy with Stran-Steel frames and gunite exteriors at Norfolk, Va., according to J. E. Bowen, general manager of Stran-Steel.

South Africa Ships Iron Ore to United Kingdom

London

• • • South Africa shipped 17,337 tons of iron ore to the United Kingdom during August—the first shipment for many years. Mr. Stuttaford, Minister for Industries, states that South Africa possesses almost unlimited supplies of high-grade ore, and that if the war continues for long iron ore exports to the United Kingdom might increase substantially.



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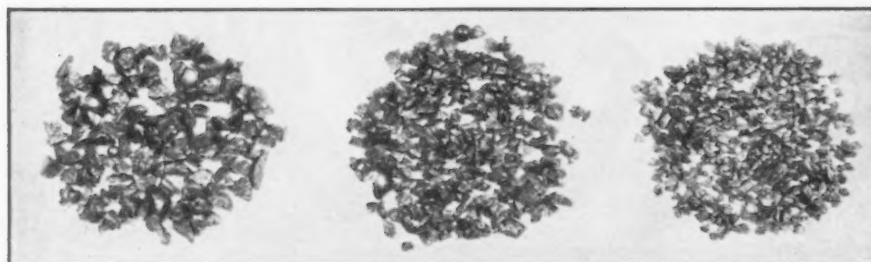
has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

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Situation in Armor Plate Improving

Washington

• • • Armor plate facilities, machine tool bottlenecks, speed up of construction of cruisers and the aluminum picture under the defense program were discussed at the White House late last week by members of the National Defense Advisory Commission. President Roosevelt was assured by Edward R. Stettinius, Jr., head of the raw materials division, that the armor plate situation was infinitely better than it appeared three months ago. William S. Knudsen, of the commission's production division, was asked by the President to report on ways for speeding up the construction of cruisers.

At his regular Friday morning press conference, Mr. Roosevelt declined to answer questions on priorities except to say that he does not believe it will be necessary to inaugurate such a system for commercial and combat aircraft. The week before he asked the industry to freeze production of commercial planes at the 1939 level.

The question of steel facilities was out in front when Mr. Stettinius held a press conference on Thursday but he declined to discuss the matter. He promised another conference would be scheduled when he is in a position to discuss the subject.

Arriving 30 minutes late from a White House meeting, where he told the President that aluminum production was being doubled, Mr. Stettinius met newsmen in the imposing walnut-paneled library of the Federal Reserve Board Building. He said that aluminum ingot production, fabricating facilities, sheet mill capacities and stocks of bauxite ore appear adequate to take care of estimated military and civilian requirements with "a sufficient surplus" to permit some increases in both civilian and military uses if necessary.

The defense commission expects temporary delays for some fabricated articles for civilian use as well as temporary delays in supplies of aluminum forgings but this is expected to be eliminated with the installation of new hammers. Aluminum ingot production, already increased from the



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Walkout of 18 Men Makes 20,000 Idle

Detroit

• • • Walkout of 18 employees in the panel assembly division of Briggs Mfg. Co., Mack Ave., plant on Friday afternoon was blamed for disruption of production at Briggs and in the Plymouth division of Chrysler Corp. As a result, approximately 10,000 men in the two plants were sent home because the flow of bodies on the Briggs' lines and to Plymouth was hindered. Another 10,000 on night shifts also were thrown out of work.

The dispute was reported to be over production rates, after the panel assembly crew was cut from 24 men to 18, although the required output was said to have been trimmed from 48 panels per hour to 24. The dispute was settled in conferences during the weekend and workers returned to their jobs Monday.

1939 level of 325,000,000 lb. to the present capacity of 465,000,000 lb. per year, are expected to be adequate for civilian use and aircraft requirements. These are based on a revised schedule of Army, Navy and British aircraft needs. The aluminum requirements, estimated four months in advance of airplane deliveries, will increase steadily, Mr. Stettinius said. Present capacity is 465,000,000 lb., while the production level next July will be 690,000,000 lb.

The Aluminum Co. of America is investing \$150,000,000 in the expansion program, while the Reynolds Metal Co., of Sheffield, Ala., will spend \$20,000,000 in RFC funds. Asked if the industry would take the rap when the war emergency has passed and aluminum demand falls off, Mr. Stettinius replied that aluminum expansion was being made without any guarantee from the Government to pay for losses.

It was likewise announced that production of magnesium, also used in plane construction, is being stepped up at an even greater pace than aluminum. In 1939 production was 6,500,000 lb. Present production is estimated at 13,500,000 lb., and is expected to reach 26,500,000 lb. in 1942.



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Its design presented unusual problems because of limited headroom and exacting requirements as to hook approaches, etc.

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Prices of Standard KENNAMETAL tools and blanks have been drastically reduced . . . so that KENNAMETAL production economies are now available to all machine shops, large or small. Write today for a copy of the new Price List No. 5.

Turning a 10-inch diameter chrome-nickel-molybdenum forging, 46 Scleroscope hard, at 150 ft. per minute. Feed, 1/32"; depth of cut, 3/8" to 7/16".



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Style No. 11 Tool with Chip Breaker

Mehornay Contact Man With Sub-Contractors

Washington

• • • Coordinator of National Defense Purchases Donald M. Nelson has named Robert L. Mehornay of Kansas City, Mo., to act as contact man between primary defense contractors and small businessmen who have facilities for sub-contracting.

Mr. Mehornay, president of the North-Mehornay Furniture Co., Kansas City, will have the title of deputy director of the small business activities office of the defense commission. Under the sponsorship of this division, district officers of the Federal Reserve Board are furnishing information on defense procurement in a decentralizing effort to help potential sub-contractors get necessary financial aid.

City Pattern Works to Buy \$50,000 of Equipment

Detroit

• • • A 14,000 sq. ft. addition is being erected by the City Pattern Works, 1161 Harper, and will be completed about Jan. 1, according to Vaughn Reid, president. The addition will include an aluminum foundry, a new core room and a new pattern shop. Approximately \$50,000 will be spent for the equipment alone.

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In building drill rigs and other equipment, Brauer Machine & Supply Co., Oklahoma City, finds Vertex economical.



Neat appearance of Vertex welds lends sales appeal to shovels, produced by Hanson Clutch & Machinery Co., Toledo, O.



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Investigate Thermit Welding, too—in use since 1902 for heavy repair work, crankshafts, etc.

Aluminum Alloy Extrusion

(CONCLUDED FROM PAGE 43)

min and Hiduminium class now form the most important products of the extrusion press. They are successfully produced, but only at the expense of the most careful supervision of temperature and pressure. All extruded material is reheated and quenched after it emerges from the press and is thereafter aged or precipitation treated. After final treatment these alloys average 60,000 lb. per sq. in. tensile strength with 15 per cent elongation. As already indicated, extrusion is merely a forming process with these materials. The extruded metal is in the annealed form, and all mechanical properties depend upon its subsequent treatment. A German investigator, H. Walbert, has studied the effect of temperature and pressure in modifying the grain or structure of extruded Duralumin but little modification was discernible. The main conclusion was that the final physical properties after treatment were quite independent of the proportions of fine and coarse grain in the extruded rods.

An important alloy devised purely for extrusion of high tensile rod and tube is known as RR 77 and gives the highest values for mechanical properties which have yet been attained. This is a copper-zinc-magnesium alloy also containing nickel and titanium with some 90 per cent aluminum. The final tensile strength is over 75,000 lb. per sq. in., and the yield strength is over 60,000 lb. per sq. in. The elongation is 8 per cent. The combination of aluminum and zinc has always proved to be a satisfactory one for the extrusion process and the addition of heat treating and grain refining elements has still further improved it. Extensive use is made of this alloy in the field of aircraft production which now dominates industry in Europe.

Government Awards . . .

Government awards for the week ended Nov. 23, as announced by the Division of Public Contracts, Department of Labor, follow:

Addressograph-Multigraph Corp., Washington; identification tags, \$84,200.

Aluminum Cooking Utensil Co., New Kensington, Pa.; utensils, \$20,990.

American Blower Corp., Detroit; draft fans, \$59,633.

American Bosch Corp., Springfield, Mass.; engine parts, \$68,493.

American Brass Co., Waterbury, Conn.; brass strip, \$129,509.

American Brass Co., Waterbury, Conn.; brass, \$13,725.

American Cast Iron Pipe Co., Birmingham, Ala.; cast-iron pipe, \$22,020.

American Cast Iron Pipe Company, Los Angeles; iron pipe, \$15,158.

American Cutter & Engineering Co., Detroit; punches, \$10,865.

American Fork & Hoe Co., Cleveland; axes, \$38,303.

Ames Baldwin Wyoming Co., Parkersburg, W. Va.; shovels, \$89,720.

Anchor Post Fence Co., New York; fence, \$10,221.

Axelson Mfg. Co., Los Angeles; lathes, \$294,283.

Axelson Mfg. Co., Los Angeles; lathes, \$14,376.

Belknap Hardware & Mfg. Co., Inc., Louisville, Ky.; range boilers, \$15,400.

Bethlehem Steel Co., Bethlehem, Pa.; bar steel, \$89,540.

Bethlehem Steel Export Corp., New York; penstocks, \$22,918.

Bodine Corp., Bridgeport, Conn.; tapping machines, \$19,515.

Bourlier Sheet Metal Works, Louisville, Ky.; stovepipe hoods, \$30,350.

Buda Company, Harvey, Ill.; engine parts, \$99,351.

Budd Wheel Co., Detroit; projectiles, \$86,774.

A. L. Cahn & Sons, Inc., New York; graters, \$28,696.

Carlton Machine Tool Co., Cincinnati; drills, \$111,378.

Case Crane & Kilbourne Jacobs Co., Columbus, Ohio; food cart, \$29,800.

Chase Brass & Copper Co., Inc., Waterbury, Conn.; condenser tubes, \$50,986.

Chicago Bridge & Iron Co., Washington; steel tanks, \$95,750.

Chicago Hardware Foundry Co., N. Chicago, Ill.; griddles, \$41,920.

Chicago Pneumatic Tool Co., Detroit; riveter, \$18,855.

Chicago Pneumatic Tool Co., Philadelphia; grinders, \$29,663.

Cincinnati Shaper Co., Cincinnati; shear machine, \$14,938.

Cleaver Brooks Co., Milwaukee, Wis.; generators, \$20,238.

Cleveland Tractor Co., Cleveland; tractors, \$185,747.

Columbia Steel Co., Los Angeles, Calif.; piling, \$11,571.

C-O-Two Fire Equipment Co., Newark, N. J.; fire extinguishers, \$39,208.

Cramp Brass & Iron Foundries Co., Philadelphia; propeller wheels, \$15,063.

Crown Iron Works Co., Minneapolis, Minn.; piers, \$21,390.

Curtiss-Wright Corp., Curtiss Propeller Div., Clifton, N. J.; propeller assem., \$307,196.

Ellis Drier Co., Chicago; washing equipment, \$10,104.

Ex-Cell-O Corp., Detroit, Mich.; pumps, \$170,673.

Ex-Cell-O Corp., Detroit; engine parts, \$13,378.

General Drop Forge Co., Inc., Buffalo, N. Y.; forgings, \$10,801.

General Electric Co., Schenectady, N. Y.; cable, \$14,826.

Gleason Works, Rochester, N. Y.; generator, \$30,339.

H & B American Machine Co., Pawtucket, R. I.; spinning frames, \$12,186.

Hannifin Mfg. Co., Chicago; recoil mechanism, \$442,641.

Hardinge Brothers, Inc., Elmira, N. Y.; lathes, \$10,391.

Hart Co., Louisville, Ky.; stoves, \$17,545.

Herring-Hall-Marvin Safe Co., Hamilton, Ohio; safes, \$28,286.

Hoosier Lamp & Stamping Corp., Evansville, Ind.; utensils, \$13,655.

Illinois Pure Aluminum Co., Lemont, Ill.; pitchers, \$22,375.

Ingersoll-Rand Co., Washington; drills, breakers, hammers, \$13,064.

International Harvester Co., Chicago; cranes, \$374,593.

International Harvester Co., Chicago; tractors, \$631,171.

International Nickel Co., Inc., New York City; nickel, \$64,320.

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Branch Plants and Warehouses: AKRON, OHIO; LOS ANGELES, CALIF.

International Nickel Co., Inc., New York; nickel copper alloy, \$17,500.
 International Silver Co., New York City; tableware, \$248,909.
 Kalamazoo Stove & Furnace Co., Kalamazoo, Mich.; stoves, \$62,390.
 Lakeside Bridge & Steel Co., Milwaukee; gate hoists, \$41,027.
 Lalance & Grosjean Mfg. Co., Washington, D. C.; plumbing fixtures, \$14,446.
 Lansdowne Steel & Iron Co., Morton, Pa.; forgings, \$539,760.
 Lloyd & Arms, Inc., Philadelphia; drilling machines, \$36,343.
 Lloyd & Arms, Inc., Philadelphia; presses, \$16,360.
 Lukens Steel Co., Coatesville, Pa.; fab. plates, \$223,629.
 MacLane Hardware Co., New York, N. Y.; scoops and shovels, \$14,743.
 Metal Goods Corp., St. Louis; copper tubing, \$16,937.
 Midvale Company, Washington; forgings, \$670,000.
 New Haven Copper Co., Seymour, Conn.; copper, \$15,984.
 Noland Co., Inc., Washington; mattocks, \$38,830.
 Novo Engine Co., Lansing, Mich.; pumps, hoists, \$16,229.
 Owatonna Tool Co., Owatonna, Minn.; motor maintenance equipment, \$24,747.
 Pacific Marine Supply Co., Seattle; pumps, \$24,148.
 Pangborn Corporation, Hagerstown, Md.; blast machine, \$24,166.
 Pittsburgh Forgings Co., Coraopolis, Pa.; forgings, \$12,135.
 Pittsburgh Screw & Bolt Corp., Pittsburgh; rivets, \$43,680.
 Henry Prentiss & Co., Inc., New York; machine, boring, \$10,115.
 Henry Prentiss & Co., Inc., New York; drilling machines, \$20,248.
 Rasmussen Machine Co., Inc., Racine, Wis.; hack saws, \$11,868.
 Remington Arms Co., Inc., Bridgeport, Conn.; shotguns, \$165,253.
 Republic Steel Corp., Culvert Div., Indianapolis, Ind.; iron culverts, \$37,000.
 Republic Steel Corp., Massillon, Ohio; steel bars, \$21,651.
 Revere Copper & Brass, Inc., Baltimore, Md.; brass, \$12,198.
 Joseph T. Ryerson & Son, Inc., Chicago; reinforcing bars, \$139,299.
 Joseph T. Ryerson & Son, Inc., Chicago; steel, \$15,866.
 Sealed Power Corp., Muskegon, Mich.; cylinder sleeves, \$12,086.
 Sidney Machine Tool Co., Sidney, Ohio; lathes, \$27,486.
 Southern Welding & Mach. Co., Charlottesville, Va.; stuffing tubes, \$17,860.
 Star Drilling Machine Co., Akron, Ohio; drills, \$159,607.
 Storms Drop Forging Company, Springfield, Mass.; forgings, \$21,389.
 Tidewater Supply, Inc., Norfolk, Va.; hoibber machine, \$12,477.
 Timken Roller Bearing Co., Steel & Tube Div., Canton, Ohio; steel, \$18,280.
 Townsend Co., New Brighton, Pa.; rivets, \$31,785.
 Truscon Steel Co., Philadelphia, Pa.; plat-forms, \$14,400.
 United States Pipe & Foundry Co., Philadelphia; water pipe, \$76,260.
 Universal Crusher Co., Cedar Rapids, Ia.; crusher equipment, \$14,768.
 The Variety Aircraft Corp., Dayton, Ohio; tool assembly, \$14,477.
 Whitin Machine Works, Whitinsville, Mass.; dry twistors, \$10,772.
 Williams White & Co., Moline, Ill.; rotary shear, \$13,500.
 Youngstown Sheet & Tube Co., Youngstown, Ohio; roofing, \$135,280.

Navy Bureau of Supplies and Accounts:
 Acheson Mfg. Co., Rankin, Pa.; flanges, pipe, bronze, cast, \$14,802.
 Ajax Mfg. Co., Cleveland; machine, forging horizontal, \$16,600.
 Aldrich Pump Co., Allentown, Pa.; pumps, centrifugal type, \$21,222.

Allis-Chalmers Mfg. Co., Milwaukee; equip-ment, shafts and couplings, \$537,280.
 American Automatic Electric Sales Co., Chi-cago, Ill.; equipment, telephone, automatic, \$339,116.
 American Brass Co., Waterbury, Conn.; brass, naval, rolled, plate and angle, \$24,475.
 American Brass Co., Waterbury, Conn.; tubes, condenser, \$6,898.
 American Car & Foundry Co., New York; lighters, tank, \$1,020,262.
 American Chain & Cable Co., Inc., Ameri-can Cable Div., Wilkes-Barre, Pa.; strand, seizing, iron or steel, \$7,498.
 American Chain & Cable Co., Inc., Hazard Wire Rope Div., Wilkes-Barre, Pa.; rope wire, \$34,202.

3000 More On Steel's Payroll In October

• • • Nearly 568,000 employees were on the payrolls in the steel industry during October, an in-crease of 3000 from the Septem-ber figure of 565,000, according to the American Iron and Steel Institute. In October, 1939, a total of 545,000 employees were at work in the industry.

Monthly steel payrolls during October totaled \$90,768,000, com-pared with \$82,068,000 in Sep-tember, and with \$83,421,000 in October a year ago.

An average of 85.6c. an hour was earned by wage earning employees in the industry during October, as against 85.4c. an hr. in September, and 84.6c. an hr. in October, 1939.

Wage earners worked an aver-age of 39.4 hr. a week in Octo-ber, which compares with 36.5 in September, and with 38.0 in October of last year.

American Electrical Heater Co., Detroit, Mich.; irons, soldering; pots, glue, electric, \$11,002.
 American Tool Works Co., Cincinnati; drills, radial, \$21,566.
 American Tool Works Co., Cincinnati; lath-s, engine, \$40,496.
 American Tool Works Co., Cincinnati; drills, radial, \$10,984.
 Arter Grinding Machine Co., Worcester, Mass.; machines, grinding, \$18,381.
 Autocar Co., Washington; trucks, tractor, \$94,770.
 Automatic Transportation Co., Division of Yale & Towne Mfg. Co., Chicago; trucks, tilting and tiering, \$38,610.
 Automatic Transportation Co., Division of the Yale & Towne Mfg. Co., Chicago, Ill.; truck, electric, \$10,240.
 Babcock & Wilcox Tube Co., Beaver Falls, Pa.; tubes, boiler and super heater, \$96,307.
 Baker Hamilton & Pacific Co., San Fran-cisco; scrapers, ship, \$10,942.
 Baldt Anchor, Chain & Forge Corp., Chester, Pa.; anchors, steel, \$20,700.
 Berkeley Steel Construction Co., Inc., Berkeley, Cal.; buoys, mooring, steel, \$45,360.
 Otto Bernz Co., Inc., Rochester, N. Y.; pots, fire, gasoline, \$5,033.
 Bethlehem Steel Co., Bethlehem, Pa.; steel, \$19,374.
 Batteryless Telephone Equipment Co., Inc., Pittsburgh, Pa.; cables, maker, \$17,839.
 Buffalo Forge Co., Buffalo; roll, bending, \$5,026.
 Burke Electric Co., Erie, Pa.; motor gen-erators, \$5,575.

Carlton Machine Tool Co., Cincinnati; drills, heavy duty, \$21,334.
 Carnegie-Illinois Steel Corp., Washington; steel, nickel, \$44,905.
 Caswell, Strauss & Co., Inc., New York; tin, pig, \$101,908.
 Central Iron & Steel Co., Harrisburg, Pa.; steel, plate, \$7,025.
 Chambersburg Engineering Co., Chambers-burg, Pa.; hammer, forging, \$11,500.
 Chicago Pneumatic Tool Co., Philadelphia; drills, rotary, air, \$12,680.
 Commercial Enclosed Fuse Co. of N. J., Hoboken, N. J.; fuses, electric, \$24,981.
 Condenser Service & Engineering Co., Inc., Hoboken, N. J.; buoys, mooring, steel, \$6,954.
 Consolidated Machine Tool Corp., Rochester, N. Y.; mill, boring, vertical, \$215,600.
 Crucible Steel Co. of America, New York; electrodes, welding, steel, \$5,544.
 Henry Disston & Sons, Inc., Tacony, Phila-delphia, Pa.; files and rasps, \$43,676.
 Dravo Corporation, Neville Island Branch, Pittsburgh; vessels, crane, non-self propelled, \$3,582,000.
 Duquesne Smelting Corp., Pittsburgh; bronze, bearing, pig metal, \$11,212.
 Edna Brass Mfg. Co., Cincinnati; flanges, pipe, bronze, \$7,270.
 Elgin National Watch Co., Elgin, Ill.; watches, stop, \$12,080.
 Elliott Co., Ridgway, Pa.; generators, main parts for, \$37,156.
 A. B. Farquhar Co., Ltd., York, Pa.; moor-ing, \$29,775.
 F. Ferguson & Son, Hoboken, N. J.; pro-pellers, solid manganese bronze, \$12,475.
 Fog Nozzle Co., Los Angeles, Cal.; nozzles, fog making, \$17,625.
 General Motors Corp., Cleveland Diesel En-gine Div., Cleveland; main engine spares for submarines, \$24,681.
 Graver Tank & Mfg. Co., Inc., East Chi-cago, Ind.; mooring, \$61,400.
 Hall-Scott Motor Car Co., New York; en-gines, marine, gasoline, \$516,788.
 C. I. Hayes, Inc., Providence, R. I.; fur-naces, electric, \$6,482.
 Heald Machine Co., Worcester, Mass.; grinder, internal universal, \$10,310.
 Hertner Electric Co., Cleveland; generators, motors, \$11,531.
 Highway Trailer Co., Edgerton, Wis.; semi-trailers, \$17,840.
 Independent Pneumatic Tool Co., Chicago, Ill.; drills, rotary air, \$10,257.
 Ingersoll-Rand Co., New York; drills, rotary air, \$11,643.
 Laganke Electric Co., Cleveland; panels, welding, \$7,776.
 Landis Tool Co., Waynesboro, Pa.; ma-chines, grinding, \$10,064.
 E. B. Latham & Co., New York; fuses, cartridge type, \$10,132.
 Lodge & Shipley Machine Tool Co., Cincin-nati; lathe, precision, \$5,830.
 Edward A. Lynch Machinery Co., Philadel-phia; machines, drilling upright, \$15,113.
 MacWhyte Co., Kenosha, Wis.; cable, steel, \$81,810.
 Marvel-Schebler Carburetor Div., Borg-War-ner Corp., Flint, Mich.; controls, hydraulic, track, \$226,237.
 Monarch Machine Tool Co., Sidney, Ohio; lathes, electrically operated, \$36,730.
 National Lead Co., Baltimore Branch, Balti-more; metal, anti-friction, ingot, \$21,510.
 Nicholson File Co., Providence, R. I.; files and rasps, \$169,532.
 North American Smelting Co., Philadelphia; metal, anti-friction, ingot, \$13,796.
 North Engraving & Mfg. Co., LaCrosse, Wis.; thermometers, oil, aircraft; gages, oil and fuel pressure, \$9,000.
 Pacific Wire Rope Co., Los Angeles; rope wire, \$36,883.
 Palmer Scott & Co., Inc., New Bedford, Mass.; boats, aircraft rescue, \$96,125.
 Pike Trailer Co., Los Angeles; semi-trailers, \$7,105.
 Pittsburgh Screw & Bolt Corp., W. Hart-ford, Conn.; rivets, tap, steel alloy, \$261,280.
 Pittsburgh Steel Co., Pittsburgh, Pa.; wire, iron or steel, \$7,687.
 Pittsburgh Steel Co., Pittsburgh; tubing, steel, \$30,390.

Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.; drills, radial, \$12,035.

Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn.; machine, drill, radial, \$7,209.

Henry Prentiss & Co., Inc., New York; machine, boring, drilling and milling, \$92,522.

Reed-Prentice Corp., Worcester, Mass.; lathes, engine, \$9,512.

Revere Copper & Brass, Inc., Baltimore Div., Baltimore, Md.; plates, copper-nickel alloy, \$54,134.

Rison Mfg. Co., Naugatuck, Conn.; grommets, spur, brass, \$52,000.

John A. Roebling's Sons Co., Trenton, N. J.; wire, copper, iron or steel, \$13,333.

John A. Roebling's Sons Co., Trenton, N. J.; thimbles, steel, galvanized, \$16,001.

Seabrook Yacht Corp., Houston, Tex.; boats, aircraft rescue, \$126,804.

Seagrave Corp., Columbus, Ohio; engine, fire, pumping, \$5,500.

Wm. Sellers & Co., Inc., Philadelphia; machines, horizontal boring, drilling and milling, \$3,299,169.

W. E. Shipley Machinery Co., Philadelphia, Pa.; lathes, bench, \$8,463.

S. Morgan Smith Co., York, Pa.; propellers, controllable pitch, \$57,950.

Southwest Welding & Mfg. Co., Alhambra, Cal.; mooring, \$183,200.

Sparrow Chisholm Co., Boston; damask, cotton, table, \$37,550.

Specialty Auto Fabric Corp., New York; clippers, bolt, \$5,400.

Standard Pressed Steel Co., Jenkintown, Pa.; benches, work, \$7,585.

Tidewater Supply Co., Inc., Norfolk, Va.; machines, horizontal, boring, drilling and milling, \$139,208.

Union Wire Rope Corp., Kansas City, Mo.; rope, wire, steel, \$49,393.

United Engineering & Foundry Co., Pittsburgh, Pa.; press, forging, \$1,972,182.

United Wire & Supply Corp., Cranston, R. I.; alloy, brazing, silver, \$18,406.

Upson-Walton Co., Cleveland, Ohio; cable, steel, \$12,420.

Upson-Walton Co., Cleveland; rope, wire, \$49,323.

Upson-Walton Co., Cleveland; shackles, anchor, \$34,871.

Warner & Swasey Co., Cleveland; lathes, turret, \$37,339.

Wire Rope Mfg. & Equipment Co., Seattle, Wash.; rope, wire, \$20,629.

Wire Rope Corp. of America, New Haven, Conn.; hawsers, towing; rope, wire, \$99,324.

Ordnance Department, Chemical Warfare Service & Quartermaster Corps:

S. G. Adams Co., St. Louis; containers, \$6,933.

Allegheny Ludlum Steel Corp., Brackenridge, Pa.; gages, \$1,100.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.; engine parts, \$38,948.

American Bantam Car Co., Butler, Pa.; \$1,419,051.

American Blower Co., Baltimore; unit heaters, \$1,338.

American Brass Co., Waterbury, Conn.; small arms ammunition, \$244,820.

American Brass Co., Waterbury, Conn.; artillery ammunition components, \$76,123.

American Machine & Metals, Inc., East Moline, Ill.; hardness tester, \$2,325.

American Machine & Metals, Inc., East Moline, Ill.; machines, \$6,640.

American Seating Co., Grand Rapids, Mich.; 150,000 chairs, folding, metal, \$247,500.

Arrow Tool & Reamer Co., Detroit; cutting tools, \$1,850.

B. G. Corporation, New York; spark plugs, \$7,084.

Barker Tool, Die & Gage Co., Detroit; gages, \$1,489.

Bausch & Lomb Optical Co., Rochester, N. Y.; fire control equipment, \$10,040.

Bendix Aviation Corp., Bendix Products Div., South Bend, Ind.; wheel and brake assemblies, \$260,100.

Bendix Aviation Corp., Eclipse Aviation Div., Bendix, N. J.; engine parts, \$4,491.

Bendix Aviation Corp., Marine Div., Brooklyn, N. Y.; artillery material, \$28,750.

Bendix Aviation Corp., Scintilla Magneto Div., Sidney, N. Y.; parts for tanks, \$8,889.

Bendix Aviation Corp., Scintilla Magneto Div., Sidney, N. Y.; engine parts, \$5,878.

Bethlehem Steel Co., Bethlehem, Pa.; artillery ammunition components, \$50,000.

Boyt Harness Co., Des Moines, Ia.; small arms material, \$4,998.

Briggs & Stratton Corp., Milwaukee, Wis.; artillery ammunition components, \$1,346,790.

Brown Instrument Co., Philadelphia; instrument and panel board, \$6,107.

Brown & Sharpe Mfg. Co., Providence, R. I.; cutters, \$3,207.

Dallas, Revere Copper, Opposes Zinc Exports

• • • C. Donald Dallas, president of Revere Copper and Brass, Inc., this week criticized the policy of "supplying America's potential enemies abroad" with raw materials needed at home for both American and British defense. He said:

"This country shipped 3775 tons of zinc to Japan in October, bringing the total of 12,042 tons for the first 10 months of 1940, every pound of which was badly needed by domestic fabricators engaged in supplying our own and British defense needs.

"The same zinc which we allowed to be delivered to Japan was so badly needed at the time by our brass manufacturers that fabricating plants all over the country are being forced to curtail production schedules when they should be increasing. The result is that deliveries which are desperately needed by Britain are being seriously delayed."

Brown & Sharpe Mfg. Co., Providence, R. I.; tools, \$2,772.

Edward G. Budd Mfg. Co., Philadelphia; ammunition components, \$130,519.

Bunell Machine & Tool Co., Cleveland, Ohio; tools, \$1,230.

Chicago Malleable Castings Co., Chicago, Ill.; iron castings, \$1,162.

Clarage Fan Co., Washington, D. C.; unit heaters, \$2,310.

Clarín Manufacturing Co., Chicago, Ill.; 150,000 chairs, folding, metal, \$304,500.

Clarke Tractor Div., Clarke Equip. Co., Battle Creek, Mich.; fork truck, \$2,673.

Cleveland Container Co., Philadelphia; ammunition components, \$10,746.

Cleveland Tractor Co., Cleveland; parts for tractors, \$3,778.

Colonial Broach Co., Detroit, Mich.; broach sections, \$1,130.

Cuyahoga Spring Co., Cleveland; belt clips, \$1,180.

C. R. Daniels, Inc., New York, N. Y.; small arms material, \$10,742.

Dayton Dowd Co., Quincy, Ill.; caustic pumps, \$1,501.

Delta Electric Co., Marion, Ind.; lanterns, 4852 electric, \$8,685.

E. I. du Pont de Nemours & Co., Wilmington, Del.; ammunition components, \$1,324.

Eclipse Air Brush Co., Inc., Newark, N. J.; machines, \$4,930.

Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J.; parts for tanks and combat cars, \$32,521.

Edgcomb Steel Co., Philadelphia; steel, \$99,384.

Edge Moor Iron Works, Edge Moor, Del.; storage tanks, \$5,500.

Fairbanks Morse & Co., Boston; scales dial, \$1,702.

Federal Motor Truck Co., Detroit, Mich.; trucks, \$42,009.

Federal Screw Works, Chelsea, Mich.; artillery ammunition components, \$2,315,650.

Ford Motor Co., Detroit; trucks, \$1,387,500.

Ford Motor Co., Detroit; cars, light 5-passenger sedan, \$625,200.

Frick Co., Inc., Waynesboro, Pa.; condensing and refrigerating installation, \$22,490.

Frick Co., Inc., Waynesboro, Pa.; refrigerating equipment, \$1,860.

Frick Co., Inc., Waynesboro, Pa.; catalyzer boxes, \$4,390.

Frick Co., Inc., Waynesboro, Pa.; refrigeration units, \$13,140.

Fruehauf Trailer Co., Detroit, Mich.; semi-trailers, 4-wheel, \$17,353.

James A. Gorsuch, Jr., Jeffersonville, Ind.; 7000 fire pots, \$8,750.

Greenfield Tap & Die Corp., Greenfield, Mass.; gages, \$55,230.

Hanson-Whitney Machine Co., Hartford, Conn.; gages, \$5,545.

Harley Davidson Co., Milwaukee, Wis.; motorcycles, \$747.

Hayes Industries, Inc., Jackson, Mich.; wheel and brake assemblies, \$471,395.

Ingersoll-Rand Co., Philadelphia; air compressors, \$2,203.

Jack-Heintz, Ltd., Cleveland; starter assemblies, \$808,785.

B. Jahn Mfg. Co., New Britain, Conn.; dies, \$4,976.

H. L. Judd Co., New York, N. Y.; small arms ammunition components, \$10,089.

Kearney & Trecker Corp., Milwaukee; milling machines, \$11,575.

Koppers Co., Bartlett Hayward Div., Baltimore, Md.; artillery material, \$9,956,000.

Louisville Tin & Stove Co., Inc., Louisville, Ky.; 16,000 spark arrestors, \$1,840.

Louisville Tin & Stove Co., Inc., Louisville, Ky.; pipe, stove, 22,000, \$2,853.

Lyon Metal Products, Inc., Aurora, Ill.; trunks, metal, box type, 153,500, \$458,965.

P. R. Mallory & Co., Inc., Indianapolis, Ind.; shackle releases, \$329,868.

Mercury Mfg. Co., Chicago, Ill.; gasoline tractors, \$2,641.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.; artillery material, \$5,710.

Monarch Machine Tool Co., Sidney, Ohio; lathes, \$3,410.

Mutual Wheel Co., Moline, Ill.; trailers, \$4,485.

Nash Engineering Co., S. Norwalk, Conn.; compressors, \$2,204.

Norton Co., Worcester, Mass.; grinders, \$2,945.

Otis Elevator Co., Yonkers, N. Y.; artillery material, \$2,722,679.

Pennsylvania Pump & Compressor Co., Philadelphia, Pa.; compressor units, \$2,049.

Philadelphia Hardware & Malleable Iron Works, Inc., Philadelphia; small arms ammunition components, \$15,180.

Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.; gages, \$31,762.

Precise Tool & Mfg. Co., Farmington, Mich.; gages, \$44,476.

Putnam Tool Co., Detroit; cutting tools, \$1,845.

Revere Copper & Brass Co., Baltimore; small arms ammunition, \$68,991.

Revere Copper & Brass Co., New Bedford, Mass.; brass, \$14,714.

Revere Copper & Brass Co., Rome, N. Y.; tubing, seamless brass, \$20,765.

H. H. Robertson Co., Pittsburgh; coated metal roofing, \$5,500.

Scheu Products Co., Upland, Cal.; bases for 25,000 grates, \$25,375.

Schlusser Mfg. Co., Philadelphia; gages, \$1,680.

Schutte & Koerting Co., Philadelphia; heat treating units, \$41,470.

Sheffield Gage Corp., Dayton, Ohio; gages, \$8,197.

H. A. Smith Machinery Co., Syracuse, N. Y.; lathes, \$12,021.

H. A. Smith Machinery Co., Syracuse, N. Y.; machinery, \$3,635.
 Standard Gage Co., Inc., Poughkeepsie, N. Y.; gages, \$12,994.
 Standard Motor Parts Co., Des Moines, Ia.; piston rings, \$1,947.
 Stedfast & Roulston, Inc., Boston, Mass.; multiple machining units, \$8,451.
 Stevens-Walden, Inc., Worcester, Mass.; tools, \$1,700.
 Strong Steel Foundry Co., Buffalo; castings, \$4,038.
 Studebaker Corp., South Bend, Ind.; tools, \$25,000.
 B. F. Sturtevant Co., Springfield, Mass.; dust collector systems, \$1,474.
 Surface Combustion Corp., Toledo, Ohio; machinery, \$68,000.
 Taft-Peirce Mfg. Co., Woonsocket, R. I.; gages, \$3,286.
 Thurston Mfg. Co., Providence, R. I.; cutters, \$1,635.
 Thurston Mfg. Co., Providence, R. I.; cutting tools, \$3,057.
 Timken Detroit Axle Co., Detroit; parts for adapters, \$13,488.
 Timken-Detroit Axle Co., Wisconsin Axle Div., Oshkosh, Wis.; gears, herringbone type, \$1,311.
 Tredegar Co., Tredegar Iron Works, Richmond, Va.; artillery ammunition components, \$7,079.
 The Tredegar Co., Tredegar Iron Works, Richmond, Va.; artillery ammunition, \$45,652.
 Tungsten Carbide Tool Co., Detroit; tools, \$1,216.
 Union Hardware Co., Torrington, Conn.; small arms material, \$5,956.
 Union Iron Works, Erie, Pa.; boiler tubes, \$2,772.
 Union Twist Drill Co., Athol, Mass.; cutting tools, \$1,332.
 Union Twist Drill Co., Athol, Mass.; tools, \$1,314.
 Union Twist Drill Co., Athol, Mass.; hobs, \$2,056.
 United Carr Fastener Corp., Cambridge, Mass.; metal cloth fasteners, \$4,044.
 U. S. Precision Products, Size Control Co. Div., Chicago, Ill.; gages, \$1,100.
 United States Rubber Co., Detroit, Mich.; bullet resisting tubes, \$11,104.
 Vandyck-Churchill Co., Philadelphia; machinery, \$14,971.
 Waltham Watch Co., Waltham, Mass.; fire control equipment, \$11,717.
 Waterhouse Co., Webster, Mass.; artillery material, \$11,118.
 West & Dodge Thread Gauge Co., Boston, Mass.; gages, \$2,359.
 Western Cartridge Co., Winchester Repeating Arms Co. Div., New Haven, Conn.; small arms material, \$1,632.
 Western Cartridge Co., Winchester Repeating Arms Co. Div., New Haven, Conn.; ammunition components, \$9,500.
 Wheeling Corrugating Co., Inc., Louisville, Ky.; 8266 hoods, stovepipe, tent, \$5,797.
 John Wood Mfg. Co., Muskegon, Mich.; parts for tanks, \$33,705.
 Worcester Stamped Metal Co., Worcester, Mass.; small arms ammunition, \$4,685.
 Wyckoff Drawn Steel Co., Pittsburgh; steel, \$31,758.
 Wright & Gade Equipment Co., Philadelphia; machinery, \$2,000.
 Yellow Truck Coach Mfg. Co., Pontiac, Mich.; tractor-trucks, \$34,150.

Alabama Unemployment Off 55,185 Since Jan. 1

Birmingham

• • • During October, 4494 persons were sent back to jobs, according to the monthly report of the Alabama State Employment Service. A reduction of unemployed in the state by 55,185 since the first of the year was cited.

U. S. Steel Head Warns Against Unjustified Rise in Wages, Prices

• • • Business and labor must work together to bring to successful fruition the nation's defense program, Irving S. Olds said this week at the annual dinner of the Illinois Manufacturers' Association at Chicago.

The chairman of U. S. Steel Corp. warned that "an ill-considered policy of industrial relations by a single company, or one unjustified strike in an important manufacturing plant now engaged in carrying forward the national program, can conceivably throw our whole economy out of equilibrium and have far-reaching and serious repercussions."

The right to strike and thus restrict production of essential defense materials should not be exercised until every reasonable effort to reach an amicable adjustment of the issue without cessation of production has been exhausted, he said.

Unjustified advances in commodity prices, or in labor rates, or in costs in general, could throw our economy into a disastrous upward price spiral of far-reaching proportions, Mr. Olds declared. Three primary aims of our national policy, he said, should be (1) the early realization of adequate national defense, (2) preservation of our system of free enterprise so that those who succeed us may enjoy the benefits of our proven economic order and (3) the avoidance of inflation.

Mr. Olds declared that new facilities of many kinds, being created to produce the countless articles needed for defense, whether paid for by the government or industry, should be completely written off during the emergency period, with no amortization hangover. "When the emergency is a thing of the past," he said, "these special government owned plants and equipment, if not then abandoned or disposed of to private industry, should be held in reserve by the government for use only in the event of another similar emergency. They should not be utilized by the government to compete with private business. Our en-

deavor today is not in the direction of state socialism, but rather a strenuous attempt to protect our nation and its institutions and our democratic way of life against possible aggression by foreign totalitarian states."

Intense activity today in national defense is due in large measure to the absence of an established munitions industry in this country and to the necessity of filling up that gap in our national armor as promptly as it can be accomplished, the U. S. Steel executive said.

"If we should take on belligerency, it will be because public opinion overwhelmingly regards the course as in the best interests of the people and not because war may be beneficial in the short run to any group of selfish individuals. Certainly no responsible business leader today looks to war as a road to sound or enduring prosperity."

New Follansbee Strip Mill in Operation

Pittsburgh

• • • The first of two new cold strip mills installed by Follansbee Steel Corp. was placed in operation early this week. The completed mill is currently working two turns a day and will begin three-turn operation next week. These four-high reversing cold mills and a temper mill represent the major part of a \$1,270,000 modernization program undertaken this year at the Follansbee, W. Va., plant.

Remains of Hopewell Furnace to Be Moved

Struthers, Ohio

• • • Plans to move the remains of the old Hopewell furnace, one of the oldest blast furnaces west of the Allegheny Mountains, now located on ground belonging to the Ohio Water Service Co., to Yellow Creek Park, were made at a civic committee meeting here last week.

Stinson Plane Plant In Michigan Reopened

Detroit

• • • Stinson division of Vultee Aircraft, Inc., a division of Aviation Mfg. Corp., which was moved last March to a new plant at Nashville, Tenn., has reopened its plant at Wayne, Mich., near Detroit, and will resume production of commercial airplanes and a newly designed trainer, it has been learned.

Production was scheduled to start up again Monday at the rate of ten airplanes a day.

Stinson, founded at Wayne more than 15 years ago, became a division of Aviation Mfg. Corp. and was moved to the Nashville plant early this year. A short time ago, through a financial transaction, Stinson also became a division of Vultee and it was announced that the plant's operations would be moved back to the original site so the 180,000 sq. ft. at Nashville could be devoted to building a larger type of plane for military use.

A \$150,000 expansion of the Wayne plant is scheduled, and Monday's staff of 150 men is expected to be swelled to 900 shortly.

Rudolph Funk is factory manager of the reconstituted organization.

Westinghouse Craftsmen Train Unemployed Men

Philadelphia

• • • Craftsmen from three plants of the Westinghouse Electric & Mfg. Co. have been granted leaves of absence to train unemployed men under the Federal Emergency Training Program. The company has furloughed these expert welders and machine tool operators so that they may assist in the training programs in Jersey City, N. J., Philadelphia, and Pittsburgh.

Some 400 unemployed men are now receiving machine operation instruction in Jersey City's Dickenson High School, in preparation for work on an ordnance equipment order at the Jersey City plant of the Westinghouse Electric Elevator Company. Two Westinghouse machinists are assisting the school's instructors.

Canada Prohibits Steel Overstocking

Ottawa

• • • For other than war industries, purchases of steel beyond actual current requirements have been forbidden, according to H. D. Scully, steel controller and chairman of the Wartime Industries Control Board operating under Munitions Minister C. D. Howe. This step has been taken to assure abundant supplies of steel to the armament and munitions industries of Canada.

The steel controller has advised the trade throughout the Dominion that any excess purchasing or over-stocking will not be permitted. Producers and manufacturers are in turn telling their customers that they will supply only normal month by month requirements.

"The restrictions are of a purely voluntary nature," Mr. Scully said, "but we have received assurances throughout the industry and from a variety of trade and other associations that they will do their utmost to prevent any sales or purchases of steel in greater than normal quantities, and that they will prevent any large purchases which could be spread over a term of months."

"We are determined," Mr. Scully said, "to prevent any purchasing practices which might be detrimental to the efficient prosecution of the war."

In a letter to the trade which is also being circulated among steel purchasers, Mr. Scully points out that in addition to his other powers, the steel controller "may buy, take possession of, or otherwise acquire steel, wherever it may be found, at a price prescribed by him, subject to the approval of the Minister of Munitions and Supply, which price would be buyers cost or current market value, whichever is the lower."

In addition to many other steps designed to conserve the supply of steel the steel controller has advised many manufacturers working on government and other orders to find substitutes for steel in products which are not of a vital war character.

Fabricated Steel Orders Largest Since April, 1931

• • • Orders for fabricated structural steel placed during October were the largest the industry has enjoyed since April, 1931, according to reports just tabulated by the American Institute of Steel Construction. A total of 233,115 tons was booked in October, which is 73 per cent of the bookings of the industry for October, 1929, when the business booked was 319,550 tons. However, the volume of orders booked during the first 10 months of 1940, 1,395,248 tons, is only 45 per cent of the volume booked during the same months of 1929, and compares with 1,121,350 tons booked during the same period in 1939.

The industry has fabricated and shipped 1,199,045 tons this year as compared with 1,195,657 tons shipped during the same period last year, and 2,796,640 tons during the same period of 1929.

Despite the temporary increase in defense orders it is obvious, says the institute, that the volume of business booked this year will not tax the capacity of the industry.

Woodward Iron Votes \$1 Dividend On Stock

Birmingham

• • • Directors of Woodward Iron Co. on Nov. 29 declared a dividend of \$1 per share payable Dec. 23, 1940, to holders of record Dec. 12, 1940. Approximately 334,000 shares of the company's stock are outstanding. This action followed ratification by stockholders of a refunding plan whereby the company's outstanding first mortgage 5 per cent bonds will be called for payment at 104 and accrued interest Jan. 1, 1941. Funds for the purpose will be provided by the sale of \$2,000,000 in notes and \$4,750,000 first mortgage bonds to 12 institutions in the South and East.

Navy Orders 38 Tank Lighters at \$1,020,262

• • • Charles J. Hardy, president, American Car & Foundry Co., announces an order from the U. S. Navy for 38 tank lighters at an estimated cost of \$1,020,262.

Steel Exports Off 12.3% In October

• • • Exports of iron and steel products, (scrap excepted), registering their second successive decline in as many months, totaled only 846,584 gross tons valued at \$47,244,586 in October, preliminary figures just released by the Metals and Minerals Division of the Bureau of Foreign and Domestic Commerce reveal. Down 12.3 per cent in quantity and 6.7 per cent in value these figures compare with

those of September—965,444 tons valued at \$50,630,630—and with those of October, 1939—255,081 tons valued at \$16,835,795.

Shipments of such leading items as non-alloy ingots and blooms, plain structural shapes, non-alloy other plates, non-alloy other bars, and pig iron were all smaller in October than they had been in September, while the volume of the trade with such outstanding markets as the United Kingdom, Japan, the Union of South Africa, and Argentina was sharply reduced.

The chief commodity exported

48-hr. Week Urged for Canadian Industry

Ottawa

• • • Lengthening of the work week in Canadian industry from 44 hr. to 48 hr. and perhaps longer was urged last week by Norman McLarty, Dominion labor minister.

"In considering the possibility of lengthening the work week, we appreciate that this involves the possible temporary relinquishing of certain standards which labor has established over the years," the Canadian minister said. "The only excuse for asking that these temporary concessions be considered is that we must win the war and sacrifice is unavoidable."

FACILITIES FOR DEFENSE SUPPLIES

This form should not be filled out for any concern that now receives invitations to bid from the Army, the Navy, or any other branch of the armed services.

TO THE FEDERAL RESERVE BANK OF NEW YORK

1. Name of concern.....
2. Address of concern.....
(Street) (City) (State)
3. State principal articles or products now manufactured or processed.....
4. What kinds of defense articles would the concern be interested in supplying?
5. State approximate or estimated number of persons employed
6. (a) State the total approximate value of sales for the year 1939
- (b) At what per cent of maximum capacity did concern operate in 1939?
- (c) At what per cent of maximum capacity is concern now operating?
7. If the concern should obtain a defense contract in reasonable relation to present or expandable capacity, would it require additional financial aid for—
- (a) Working capital purposes?
- (b) Fixed capital purposes?
8. Could reasonable financial aid be obtained from local banks?

Name of bank submitting report

Signature of officer

PLEASE TYPE ANSWERS

(Note: This form should be filed in triplicate with the Federal Reserve Bank of New York.)

R-730c

MORE FACILITIES FOR defense: In order that productive facilities of the nation may be more fully utilized in the National Defense Program, banking institutions have been asked to gather information regarding companies in their districts which are not yet on the Army or Navy invitation bidding lists. One object is to enable small business concerns to participate more fully in the defense program. The banks are using the above form.

during October was non-alloy ingots, etc., 208,461 tons including 165,522 tons sent to the United Kingdom, 16,820 tons to Canada, and 12,887 tons to Japan. Second rank went to alloy ingots—the trade in which had risen sharply to 110,632 tons and including shipments of 106,296 tons taken by the United Kingdom. Plain structural shapes—of which 55,187 tons in all was exported during the month—went principally to the United Kingdom, 30,304 tons, and Canada, 12,762 tons, while of the 51,933-ton trade in non-alloy other plates 18,060 tons moved to Canada and 15,564 tons to the United Kingdom.

Comparative figures describing the trade with leading markets show the United Kingdom to have taken 461,480 tons of iron and steel in October against 607,931 tons in September, Canada to have bought 122,723 tons against 105,933 tons, Japan 45,599 tons against 54,845 tons, the Union of South Africa 17,825 tons against 34,255 tons, and Argentina 19,508 tons against 14,179 tons.

Cumulative figures covering the first 10 months of 1940 show the iron and steel export trade of that period to have been several times as great as that of the comparable period of 1939. Between Jan. 1 and Oct. 30, 1940, exports totaled 6,336,535 tons valued at \$389,228,117 against the 1939 10-month figures of 1,772,068 tons valued at \$116,555,474.

Census Shows Radiator Boiler Sales At \$152 Millions

Washington

• • • Eight corporations manufacturing radiators, heating boilers, industrial oil burners, stoves and warm-air furnaces were represented in a Federal Trade Commission report last week as having 1939 sales aggregating \$152,478,026, or slightly under 35 per cent of the total value of such products reported by the Bureau of the Census for 1937.

Combining the data of the eight companies without disclosing individual results, the FTC survey said that of the total sales, \$149,371,475 or 98 per cent represented domestic sales, and \$3,106,551 or 2 per cent represented foreign sales. The average rate of return for the eight corporations ranged from a profit of .4 per cent to 24.5 per cent for 1939, the commission reported.

Ship Building Controller Appointed By Canada

Ottawa

• • • David B. Carswell, director general of the naval construction branch of the Department of Munitions and Supply has been appointed controller of ship construction and ship repairs for the Dominion of Canada. C. D. Howe announces. The purpose of the appointment, Mr. Howe said, is to assure a maximum utilization of Canadian ship building and repair facilities in order to meet the present and potential wartime needs of the Dominion and her Allies. Mr. Carswell, superintendent of the Detroit Shipbuilding Co. in 1914, will continue his duties as director general of the Naval Construction Branch of the Department.

Machine Tool Jobbing Work Firm Organized

Cincinnati

• • • Formation of Charles W. Doepke Mfg. Co. in Cincinnati, to handle tool jobbing work was announced last week. Mr. Doepke, president of the company, said that his plans are to handle special jobbing work for machine tool makers, and to manufacture surgical instruments.



NO PLACE FOR SENTIMENT in mass production? When William Bluth (top photo, holding a cake knife) walked into the Pontiac plant cafeteria last week he found his fellow workers in the Pontiac paint department ready to celebrate his 25th anniversary with Pontiac and his 57th birthday. The boys had reserved a whole cafeteria section to honor Bill Bluth.

GOOD NEIGHBORS! When Gar Wood, president of Gar Wood Industries, Inc., Detroit, visited Rio de Janeiro recently he made some new friends among Brazilians. Two are pictured above, on a return visit to Gar Wood's road machinery division, Detroit. They are (left to right) Darke Behring Mattos, 37-year-old Brazilian industrialist, and (center) Ouido Abreu, financial secretary of the state of Minas Geraes.

Willys to Begin Shell Manufacturing in April

Toledo, Ohio

• • • Willys-Overland Motors, Inc., will begin operations next April on the \$8,750,000 ammunition and shell parts contract recently awarded by the War Department, Joseph W. Frazer, president, said.

Mr. Frazer confirmed a report from Washington that the government would lease \$1,600,000 worth of machinery to enable the firm to fulfill this contract and other contracts it expects to receive.

Jesse Jones, Secretary of Commerce and Federal Loan Administrator, said the machinery would be installed and owned by the Defense Plant Corp., subsidiary of the Reconstruction Finance Corp. The Willys-Overland will avoid having to borrow funds to purchase ammunition making machinery.

Woodward Iron Renews Agreement With SWOC

Birmingham

• • • A contract between Woodward Iron Co. and its 350 blast furnace employees, which expired June 1, 1940, has been renewed without change except for a clarifying paragraph on rights of employees to request wage advances, H. A. Berg, Woodward Iron president, said.

Mr. Berg said the contract, extended to June 1, 1941, was renewed following a brief conference between William Mitch, regional director of the Steel Workers Organizing Committee and himself. The agreement, he said, does not provide for a dues check-off.

27,200 More Employed in Wisconsin Factories

Milwaukee

• • • Despite the fact that some Wisconsin factories have not been operating at full capacity, employers in the state had 27,200 more workers in October and lifted weekly payrolls more than \$1,000,000 above corresponding totals for October, 1939, according to a report from the Wisconsin industrial commission. Workers increased their weekly hours of work from 37.1 in 1938 to 39.2 in 1939 and 39.8 this year.

U. S. to Get Metals For China Loan

Washington

• • • The \$50,000,000 in immediate general purpose credits extended to China will be retired through deliveries of metals essential to the defense program. Under the arrangement the Chinese government is to deliver wolframite, antimony and tin for which the Metals Reserve Co., RFC subsidiary, already has contracted in the sum of \$60,000,000.

The balance of the \$100,000,000 loan to China, announced late last week by the White House, will be for currency stabilization credits. A statement from Federal Loan Administrator Jesse H. Jones explained the purchasing program this way:

"In connection with the purchase of critical and strategic materials in our national defense program, the Metals Reserve Co., a subsidiary of RFC, is arranging for additional purchases of wolframite, antimony and tin from the National Resources Commission of China to the value of \$60,000,000 to be delivered during the next few years at prices commensurate with market conditions as the metals are delivered."

H. S. Vance Resigns As Machine Tool Director

Buffalo

• • • Finding it necessary to resume his position as chairman of the Studebaker Corp., H. S. Vance has resigned as director of the Machine Tools and Heavy Ordnance Division of the National Defense Advisory Commission. He will continue to serve the division in an advisory capacity. Mason Britton is acting as Mr. Vance's successor. Joining the division staff recently were E. Porter Essley, secretary of the E. L. Essley Machinery Co., Chicago, and Howard W. Dunbar, vice-president of the Norton Co., Worcester, Mass. Mr. Dunbar, as a member of the defense committee of the National Machine Tool Builders association and past president of that trade group, has been spending much of his time in Washington in recent months.

\$500,000 Bonus to Be Paid Allis-Chalmers Employees

• • • Allis-Chalmers Mfg. Co. will give its employees a Christmas bonus of about \$500,000 on the basis of 2 per cent of their total earnings for the 12 months preceding the last pay in November. All shop and office employees (but not members of the management) will participate.

Enameled Utensil Wage Board of 6 Organized

Washington

• • • Howard Fawcett, president of Republic Stamping & Enameling Co., Canton, O., and E. G. Gardner, vice-president, National Enameling and Stamping Co., Milwaukee, have been named employer representatives on a six-man committee appointed under the Fair Labor Standards Act to recommend minimum wages for the enameled utensil industry.

Wage-Hour Administrator Philip B. Fleming estimated that 23 manufacturers in the industry employ about 9000 workers, of whom approximately 1000 are said to be receiving less than 40c. an hour. The minimum rate fixed by the wage-hour law at present is 30c. an hour. The highest rate the committee can recommend is 40c.

The enameled utensil industry is defined as "the manufacture of culinary, household, and hospital utensils of sheet iron or sheet steel coated with vitreous enamel." This definition, it was explained, covers all occupations in the industry necessary to the production of the specified articles, including clerical, maintenance, shipping and selling. It does not cover employees of independent wholesalers, or manufacturers who are engaged exclusively in marketing and distributing products of the industry which have been purchased for resale.

Other members of the committee are Thomas L. Norton, professor of economics, University of Buffalo, chairman; Dr. Frank Lewand, assistant professor of economics, Catholic University; Harold J. Ruttenberg, research director, Steel Workers Organizing Committee, Pittsburgh; and John D. Tuttle of the International Council of Fabricated Metal, Culinary, Dairy, Gasoline Utensil and Enamelware Workers, Canton, O.

Navy Will Utilize Ford Trade School

Washington

• • • Ford Motor Co.'s trade school is being made available to the Navy to supplement the regular service schools at naval training stations at Norfolk, Va., and San Diego, Cal.

Training at the Ford plant will begin in January and will include intensive instruction in electricity, machine work, metal work, diesel engines and other subjects. Approximately 300 recruits will be selected monthly for training at the Ford school, the department announced.

Because the rapidly expanding naval program has taxed existing naval schools to the limit, the Navy recently decided to open an additional service school at the naval training station at Great Lakes, Ill. Accepting the facilities of the Ford Motor Co., it was said, will permit a greater expansion for training the enlisted personnel of the regular Navy.

N. Y. Aircraft Industry Needs 1200 Engineers

• • • Within a year as many as 6000 graduate engineers will be required by the aircraft industries in the Metropolitan New York area, including northern New Jersey, according to a survey just completed by the New York Committee on Engineering Training for National Defense at the request of the federal government. Although the survey covered 174 manufacturing plants of 18 groups of industries, it was found that the greatest need was among manufacturers of airplanes, engines and other aircraft equipment. Since 1937, the number of wage earners in the aircraft industries of this region has been multiplied at least 50 times. The magnitude of the demand from this one local industry for engineers may be gaged by the fact that the nine colleges participating in the program graduate only 1200 engineers of all kinds in a year, while the total for the nation is only 12,000.

Aside from the engineering field, the prevailing demand is for machine operators and other trained workers. At a somewhat higher level there is an insistent demand

for draftsmen, including machine designers and tool and die designers, also production men.

While the survey revealed that the basic requirement of the defense industries is additional fully trained engineers, the report also recommended short term, intensive training of high school graduates and selected students of liberal arts colleges to help meet the emergency. The survey was one of three pilot surveys made throughout the country to determine the needs for technically trained men. The study was directed by James Creese, vice-president of Stevens Institute of Technology, and was released by Thorndike Saville, dean of the college of engineering, New York University.

October Hardware Exports 17% Above September

Washington

• • • The Commerce Department's specialty division reports that October exports of hardware and allied lines were valued at \$5,454,115, a 17 per cent increase over the September total and an 8 per cent increase over the October figure last year.

Compared to October, 1939, abrasives declined 18 per cent to \$830,898. Cutlery exports were down 17 per cent to \$354,539. General and builders' hardware, hand tools, plumbers' goods, chains and tin cans registered increases. Chain exports increased 110 per cent; tin cans 47 per cent.

Auto Assemblies Top Million in 2 Months

Detroit

• • • Assembly of more than one million automobiles and trucks in the October-November period is indicated by the total of weekly production estimates by Ward's Automotive Reports. The unexpected advance in the last weeks of November raised the total for that month to approximately 500,000 units. Since Oct. 1 the total is 1,036,468. This is higher than any two-months output since 1929 except for March-April and May-June in 1937, according to Ward's.

Week-Long Aluminum Strike of 75,000 Ends

Pittsburgh

• • • The week-long strike of 7500 CIO Aluminum Co. of America workers at the New Kensington, Pa. plant, resulting in a wage loss approximating \$250,000, was settled by compromise last week when the employee over whom the union struck because he allegedly threatened a dues collector, was transferred to another Aluminum company plant.

The union claims the man was disciplined and will be ostracized but the company denies this claim, merely saying the man was transferred and will work under the same conditions as other employees. The company charged the strike resulted solely from a question of collecting union dues.

Philip Murray, new CIO head, was instrumental in bringing about the settlement of the strike which appeared to involve an attempt on the part of the union to further efforts toward union check-off.

No Additional '40 Income Taxes, Sales Tax Likely

Washington

• • • On the heels of the White House announcement last week that President Roosevelt is opposed to a federal sales tax, Administration and Congressional tax experts said after conferring with the President that no additional taxes on 1940 income are in the cards at this session of Congress or retroactively at the next.

Senator Pat Harrison, chairman of the Senate Finance Committee, declared that not only were no definite decisions reached on tax sources or on another tax bill, but the group arrived at no specific conclusions on the increase in the national debt. Neither was there any decision reached on possible provisions in any new tax bill for amortization of defense costs. The Senator indicated, however, that his group and members of the House Ways and Means Committee will start new tax discussions early in January. The two committees plan to work closely on the matter, he said.

• **J. E. Bowen** has been appointed general manager of the Stran-Steel division of Great Lakes Steel Corp. In 1929 as representative of McClintic-Marshall Co., he was in charge of structural design in the construction of the original Great Lakes plant. In 1930 he became superintendent in charge of erection of steel structure for the Philadelphia and Reading Railroad. In 1933 he was associated with Gibbs & Hill, consulting engineers, New York, where he remained until 1935 when he returned to Great Lakes assisting in the design of plant expansion. In 1937 he was appointed chief engineer of the Stran-Steel division and promoted to assistant manager this year. He is a member of the Association of Iron and Steel Engineers and an associate member of the American Society of Civil Engineers.

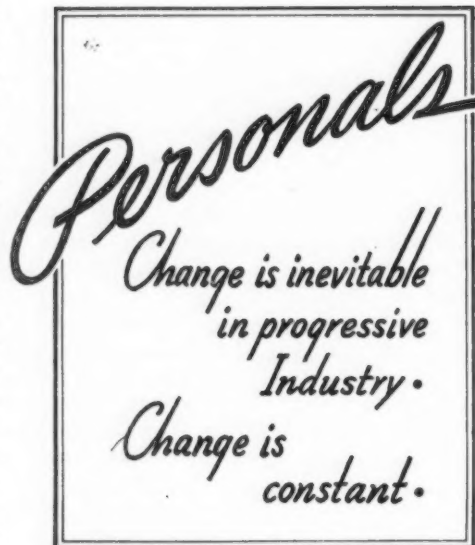
• **Leon R. Ludwig** has been appointed manager of two newly-combined sections of Westinghouse Electric & Mfg. Co.'s switchgear division at East Pittsburgh. Mr. Ludwig, who has been manager of protective devices engineering for the last five years, will head the combined division of circuit breaker and protective devices engineering. He has been with Westinghouse in various capacities since 1925.

• **E. H. Mebs**, metallurgist of the Ohio Steel Foundry Co., Lima, Ohio, for the past 10 years, has resigned to accept a position with the United States Steel Corp.

• **John E. Shook**, superintendent of the Mercer Tube & Mfg. Co., Sharon, Pa., has been named vice-president in charge of operations.

• **Joseph W. Yowell**, for the past five years with Pan-American Airways, has joined the instrument division, to handle airplane instrument sales, of Manning, Maxwell & Moore Inc., Bridgeport, Conn. His duties will be to coordinate specifying and purchasing of the company's airplane instruments by the several foreign governments having purchasing commissions in the United States.

• **Clarence L. Taylor**, formerly vice-president in charge of engineering of the Aetna-Standard Engineering Co., Warren, Ohio, has been elected vice-president in charge of engineering of the



Arms-Franklin Corp., Franklin, Pa., designer and builder of steel mill equipment. **Delmont Calladine**, formerly superintendent of the Warren, Ohio, plant of Aetna-Standard and later superintendent of the Taylor-Winfield Corp., has been appointed manager of operations.

• **Gaylord G. Thompson**, formerly supervisor of the application and control of carbide tools at the Gisholt Machine Co., Madison, Wis., has been appointed tool engineer for the McKenna Metals Co., Latrobe, Pa. He will be in charge of the installation and use of Kennametal carbide tools and



GAYLORD G. THOMPSON, tool engineer for McKenna Metals Co.

blanks in the North Central district, with headquarters in the Talcot Building, Rockford, Ill. Early in his career he was foreman of the experimental tool room of the International Harvester Co., then spent two years teaching mechanics at the University of Wisconsin. He was then successively manufacturing analyst for the Western Electric Co., assistant to the general manager in charge of estimating contract work and tooling methods at the National Brake & Electric Co. and sales manager for the Galland-Henning Mfg. Co.

• **Paul E. Thixton** has been named field representative of the public relations department of Carnegie-Illinois Steel Corp. He has served as assistant director of industrial relations at the Gary works and during the past summer was in charge of public relations for the United States Steel Corp.'s exhibit at the New York World's Fair.

• **George Burnside** has become a partner in the Coulter-Sibbett Steel Co., Oakland, Cal.

• **Forman H. Craton**, who has been identified with the General Electric Co., Schenectady, N. Y., since 1924 when he joined the company's factory management course, has been appointed section head of the industrial haulage section of the transportation department at Erie, Pa.

• **George Belicka, Jr.**, formerly assistant production manager and inspection engineer for the Pratt-Daniel Corp., Port Chester, N. Y., has been made assistant estimating and detail engineer for the Colonial Iron Works Co., Cleveland.

• **E. W. Sharninghausen**, who has been purchasing agent of the American Engineering Co., Philadelphia, since 1918, has been elected treasurer. He will continue to serve as director of purchases.

• **Irvin A. Ruder** has been made manager of the merchant iron and steel division of Iron & Steel Products, Inc., Chicago.

• **R. A. Travisano**, who has been identified with the Worthington Pump & Machinery Corp., Harrison, N. J., since 1912, has been made traffic manager, succeeding the late H. T. Smith.

• **E. E. Moore**, who has been associated with United States Steel Corp. subsidiaries since 1919, has been elected vice-president, industrial relations, Carnegie-Illinois Steel Corp., Pittsburgh, succeeding **D. A. Barrett**, who retired Dec. 1, upon completion of 44 years of service with the corporation and predecessor companies.

Mr. Moore first joined United States Steel in 1919 as a machinist at the Gary mill of the American Sheet & Tin Plate Co. The following year he was made foreman of the machine shop there and three years later was transferred to the Pittsburgh office to do special work. Within a short time he was appointed assistant manager of the Shenango works, remaining until 1926 when he returned to the Gary tin mill as assistant manager in charge of construction and operation of the new 42-in. strip mill. Six years later he became assistant to the vice-president of Illinois Steel Co. when it became a part of Carnegie-Illinois Steel Corp., Mr. Moore was appointed general superintendent of its South works, Chicago. For the past three years he has been general superintendent of its Gary works.

Mr. Barrett has acted in a supervisory capacity since 1901, when he became hot mill foreman at the former LaBelle works. From 1904 until 1928 he served the American Sheet & Tin Plate Co. as superintendent or manager in plants in the Ohio Valley and at Vandergrift, Pa. He became assistant to the vice-president in 1929 and was elected vice-president four years later. When American Sheet & Tin Plate Co. became a part of Carnegie-Illinois in 1936 he was elected vice-president, industrial relations, the position he has held until the present.

• **William E. Ludden** has been elected president of the L. E. Zurbach Steel Co., Somerville, Mass. **William A. Brown** has been made general manager and treasurer.

• **Walter P. Stoffel** has been elected president of the Charter Oak Stove Co., St. Louis, to succeed **Leslie Dana**, who has resigned. Mr. Stoffel has been connected with the company for 41 years, beginning as an office boy at the age of 16 years. **Gilford Duncan**, president of the Ludlow-Saylor Wire Co., has been elected



E. E. MOORE, vice-president, industrial relations, Carnegie-Illinois Steel Corp.

D. A. BARRETT, who relinquishes the post of vice-president, industrial relations, Carnegie-Illinois Steel Corp., to retire.



chairman of the board of directors.

• **L. D. Tenerelli**, Newark, N. J., has been elected president of the Superior Iron Works, Superior, Wis., recently acquired as a subsidiary by the Lidgerwood Mfg. Co., Elizabeth, N. J. Other officers chosen were: First vice-president, **W. S. Schalscha**, Short Hills, N. J.; second vice-president, **F. R. Zimmerman**, Duluth, Minn.; treasurer, **G. L. Reeh**, Westfield, N. J., and secretary, **Charles Gray**, Superior,

Wis. Mr. Gray will be office manager and Mr. Zimmerman, works manager.

• **L. A. Chaminade**, chairman of the Detroit Section of the Society of Automotive Engineers, has been named engineer in charge of design by Chevrolet. His former position was that of chassis unit engineer.

• **George D. Cain** has been made superintendent of the open hearth department of Gulfsteel district, Republic Steel Corp., Gadsden, Ala. Mr. Cain, born in Town Point, Md., started in the steel industry with Lukens Steel Co. in the open hearth department. He gained additional experience with Standard Steel Car Co., and at the Ohio works of U. S. Steel Corp., Youngstown. From 1913 to 1927 Mr. Cain worked as a melter, first with Youngstown Sheet & Tube Co. for seven years and then with Weirton Steel Co. In 1927 he joined the Trumbull Steel Co. in Youngstown as open hearth superintendent and was with this organization when it became a part of Republic. Mr. Cain was transferred two years ago to Republic's Cleveland district.

• **William A. Phair**, former associate editor of *THE IRON AGE*, has been appointed metals editor of the *New York Journal of Commerce*, succeeding **Harold A. Knight**, who resigned recently to assume editorial duties with *Steel*.

• **Thomas Gerlach**, executive engineer of Aviation Mfg. Corp., Williamsport, Pa., has been transferred to Detroit, where he will be associated with **Peter Altman**, whose connection with the company's research and development division was announced last week in *THE IRON AGE*. Mr. Gerlach will be active in the development of the company's research and development program. **Alfred Kos**, chief sales engineer of the Truscon Steel Co., Cleveland, has also been appointed to the research and development division and will be associated with Mr. Altman and Mr. Gerlach. Mr. Kos has been with Truscon Steel for the last 13 years.

• **Paul L. Gillan**, formerly assistant chief engineer and automotive engineer for the Lycoming Mfg. Co., Williamsport, Pa., has joined the automotive and industrial engineering consultation staff

of Aluminum Industries, Inc., Cincinnati. He will work with the engineering staffs of automotive aircraft and industrial companies on parts and castings problems.

• **Paul Keller** has been appointed Cleveland district sales manager for Copperweld Steel Co., Warren, Ohio. He is a graduate of the University of Tennessee and was previously connected with the Mid-States Steel & Wire Co. and Bethlehem Steel Co. He will make his headquarters in the Swetland Building, Cleveland.

• **G. H. McIntyre**, director of research of the Ferro Enamel Corp., Cleveland, has been appointed chairman of the Committee on the Research Associate at the National Bureau of Standards. This committee supervises the work of **Dr. Paul Smith** who has served as research associate for the Porcelain Enamel Institute for the past three years. Dr. McIntyre's appointment as chairman of this committee was made at the Fifth Annual Forum of the Porcelain Enamel Institute recently held at the University of Illinois.

• **W. C. Buchanan**, president, Globe Steel Tubes Co., Milwaukee, was elected a member of the board of directors of Allis-Chalmers Mfg. Co. at the latter company's board meeting in New York last week. Mr. Buchanan was named to fill one of two vacancies on the Allis-Chalmers board created by the deaths of Gen. Otto H. Falk, former board chairman, and of Oscar Gubelman, a director for many years.

• **C. E. Wormuth**, manager of the Detroit Safety Council, has been commissioned by the Department of Labor as Michigan chairman of the National Committee for the Conservation of Manpower in Defense Industry. Special agents appointed to the Committee include **C. E. Weiss**, industrial relations manager of the Packard Motor Car Co., **Clifford Cornell**, assistant personnel director of Chrysler Corp.; **M. J. McCarthy**, director of safety, Fisher Body division of General Motors Corp.; **R. A. Shaw**, safety director of the Murray Corp. of America, and **Hoyt L. Fracher**, director of personnel, Detroit Steel Products Co. Mr. Wormuth will appoint an advisory council to assist industry in establishing safe practices in the production of war materials.

Obituary

• **William Goudy**, one of the founders of the National Roll & Foundry Co., Avonmore, Pa., and its president and general manager since 1917, died at his home in Avonmore, Nov. 28, aged 67 years. After following the machinist's trade for a number of years, he became master mechanic of the Cincinnati Rolling Mill Co. in 1898 and held this position until 1901 when the company was acquired



HERBERT A. BAKER, president of American Can Co., whose death was announced in these columns last week.

by the American Sheet Co. He then became foreman of the Canton Roll & Machine Co., Canton, Ohio, leaving in 1906 to join in the founding of the American Roll & Foundry Co., Canton, of which he became superintendent. In 1909, he helped in the organization of the National Roll & Foundry Co., of which he was superintendent and treasurer from 1909 to 1917.

• **Frank B. Hamerly**, vice-president of the Independent Pneumatic Tool Co., Chicago, died of a heart attack while inspecting the company's plant at Los Angeles, on Nov. 27, aged 53 years. He had lived in Aurora, Ind., where the

company has a plant, for the past 28 years.

• **Brigadier General W. R. Dunlap**, associated with Carnegie-Illinois Steel Corp., Pittsburgh, as special representative in the public relations department, died suddenly from a heart attack early last week. He was 55 years old.

He was well known throughout the country as well as the state because of his association with the National Guard and was the youngest Colonel in the United States Army at the close of the first World War. General Dunlap had recently been raised from the level of Colonel to Brigadier General and was affiliated with the U. S. Army Ordnance Association.

• **Richard C. Coombs**, for 25 years a member of the sales force of Inland Steel Co., Chicago, before his retirement in 1936, died on Nov. 17, aged 80 years.

• **H. C. Dreibuss**, chief mechanical engineer of the Scullin Steel Co., St. Louis, died in that city on Nov. 22. He had been identified with the company for 34 years.

• **Louis J. Maroska**, vice-president and general manager of the Stuart Foundry Co., Detroit, died at Hartford, Conn., on Nov. 27, aged 56 years. Mr. Maroska had moved from Detroit to Hartford three years ago but retained his connection with the Stuart Foundry Co. which he helped to organize 25 years ago. Before that he was with the Kahl Foundry Co. for 18 years.

• **George F. Raab**, president of the Paramount Plating Co., Detroit, was buried Nov. 27. Mr. Raab, who was 62 years old, was born in Dayton, but had lived in Detroit nearly 40 years. He had been engaged in the plating business most of his life. He founded the Apex Plating Co. of which he was president for many years, and recently took over the Paramount company.

• **Harold H. Black**, sales representative of Murray Corp. of America, was buried Nov. 23 at Detroit. Mr. Black was born 42 years ago in St. Clair, Mich.

• **Harry Stoney**, chief mechanical engineer of the Gillette Safety Razor Co., died suddenly at his home in Watertown, Mass., on Nov. 19, aged 55 years.

Bethlehem Will Construct 6 New Openhearth, 2 Blast Furnaces

••• E. G. Grace, president of Bethlehem Steel Co., announced Tuesday that Bethlehem is planning an expansion program to add approximately 850,000 tons of steel ingots, 800,000 tons of coke and 700,000 tons of pig iron to its present annual capacities.

Additional facilities, Mr. Grace said, "are being provided after discussion with representatives of the Advisory Commission to the Council of National Defense who recognize the desirability of having this increased capacity available to help supply the capacity requirements of the national defense program.

"The new facilities include six new open hearth furnaces, two batteries of coke ovens with additions to one of the existing by-product plants, two new blast furnaces and two old blast furnaces which are to be rebuilt and enlarged. These facilities are in addition to two electric steel furnaces, having an annual capacity of 120,000 tons and other facilities, all of which were authorized earlier this year. The new facilities will be located at the Bethlehem, Lackawanna, Maryland and Steelton plants of the company and will supplement existing facilities at those plants.

"The estimated cost of the facilities to be provided in the new program will be approximately \$18,000,000. Including these expenditures the total cost of all facilities constructed or authorized by Bethlehem in 1940 will exceed \$50,000,000.

"In addition, other facilities costing over \$50,000,000 are being constructed at various plants and shipyards of Bethlehem and will be paid for and owned by the government."

Mr. Grace called attention to the big increase recently in Bethlehem's requirements for steel to supply forged steel products such as armor plate, gun forgings, projectiles, ship shafting, turbine parts, etc., as distinguished from

the standard commercial rolled steel products.

"The additional steel provided in this program will in part supply their requirements and it is believed the remainder can be converted into other products with the finishing facilities now available without further important expenditures by the company for processing equipment."

In this connection Mr. Grace also called attention to the fact that December will be the fifth consecutive month in which Bethlehem has operated in excess of 100 per cent of its rated steel capacity and said, "in this production there have been substantial tonnages for Great Britain. It

November Iron Output At 97.2% of Capacity

Production of coke pig iron in November (partly estimated) totaled 4,402,804 net tons, compared with 4,447,366 tons in October. On a daily basis production in November made a gain of 2.3 per cent over that in October, or from 143,463 tons to 146,760 tons in November, indicating an operating rate for the industry of 97.2 per cent of capacity. The operating rate in October was 94.8 per cent.

There were 201 furnaces in blast on Dec. 1, operating at the rate of 148,150 tons a day, compared with 196 on Nov. 1, making 144,290 tons. Six furnaces were blown in during the month and one was blown out. The United States Steel Corp., independent and merchant producers each blew in two furnaces. An independent producer blew out one furnace for repairs.

Among the furnaces blown in were: a Bethlehem unit of Bethlehem Steel Co., one Edgar Thomson, one Ohio, Carnegie-Illinois Steel Corp., one Oriskany, E. J. Lavino & Co., one Hamilton,

would appear that British requirements for steel are likely to increase rather than decrease. The importance of supplying this demand in addition to that of our own defense program is obvious."

Applications are being made to Secretary of the Navy and to the Advisory Commission Committee Council of National Defense for certificates of necessity to permit amortization of the cost of the new facilities in accordance with the provision of section 124 of the Internal Revenue code.

Mr. Grace added that some work has already been done on the new facilities, plans and engineering details covering the entire program are being about completed. Construction will proceed promptly as soon as the application has been approved. Part of the new facilities will be completed within six months and the entire program will be completed within 12 months.

American Rolling Mill Co., and North Birmingham No. 3, of Sloss-Sheffield Steel & Iron Co.

The furnace blown out for repairs was a Calumet unit of Wisconsin Steel Co.

Detroit Chapter to Discuss Welding in Defense

Detroit

••• The possibilities of greatly increased use of resistance welding in the defense program will be discussed Friday, Dec. 6, at a meeting of the Detroit Section, American Welding Society, by B. F. Wise, chief electrical engineer of Federal Welder & Machine Co., Warren, Ohio. Mr. Wise will have on display an exhibit of specimens of welded aircraft parts, shells and other armament components that will be of general interest.

The meeting is being sponsored by the Resistance Welder Manufacturers Association and officers of the Association are expected to be present at the meeting. The session will start at 8 p. m. in the Colonial Room, Detroit Leland Hotel.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Dec. 3, 1940	Nov. 26, 1940	Nov. 4, 1940	Dec. 5, 1939
Flat Rolled Steel: (Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10

Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate	\$5.00	\$5.00	\$5.00	\$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10

Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)				
Heavy rails	\$40.00	\$40.00	\$40.00	\$40.00
Light rails	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00

Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	1.92
Skelp (grv'd.)	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 118-123 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

	Dec. 3, 1940	Nov. 26, 1940	Nov. 4, 1940	Dec. 5, 1939
Pig Iron: (Per Gross Ton)				
No. 2 fdy., Philadelphia	\$24.84	\$24.84	\$24.84	\$24.84
No. 2, Valley furnace	23.00	23.00	23.00	23.00
No. 2, Southern Cin'ti.	23.06	23.06	23.06	23.06
No. 2, Birmingham	19.38	19.38	19.38	19.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	23.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	24.34
Basic, Valley furnace	22.50	22.50	22.50	22.50
Malleable, Chicago†	23.00	23.00	23.00	23.00
Malleable, Valley	23.00	23.00	23.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	\$22.25	\$22.00	\$21.50	\$18.75
Heavy melt'g steel, Phila.	20.75	20.75	20.75	19.25
Heavy melt'g steel, Ch'go	20.50	20.25	19.75	16.75
Carwheels, Chicago	21.25	21.00	20.25	16.00
Carwheels, Philadelphia	23.25	23.25	22.75	20.75
No. 1 cast, Pittsburgh	22.25	22.25	22.25	19.75
No. 1 cast, Philadelphia	23.25	23.25	22.75	20.75
No. 1 cast, Ch'go (net ton)	18.75	18.00	17.75	14.50

Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	\$5.25	\$5.25	\$4.75	\$5.00
Foundry coke, prompt	5.75	5.75	5.25	5.75

Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	12.50
Copper, Lake, New York	12.00	12.00	12.00	12.50
Tin (Straits), New York	50.20	50.375	51.00	52.00
Zinc, East St. Louis	7.25	7.25	7.25	6.00
Lead, St. Louis	5.35	5.65	5.35	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Dec. 3, 1940	2.261c. a Lb.	\$22.61 a Gross Ton	\$21.17 a Gross Ton
One week ago	2.261c. a Lb.	\$22.61 a Gross Ton	\$21.00 a Gross Ton
One month ago	2.261c. a Lb.	\$22.61 a Gross Ton	\$20.67 a Gross Ton
One year ago	2.261c. a Lb.	\$22.61 a Gross Ton	\$18.25 a Gross Ton

	High	Low
1940	2.261c., Jan. 2	2.211c., Apr. 16
1939	2.286c., Jan. 3	2.236c., May 16
1938	2.512c., May 17	2.211c., Oct. 18
1937	2.512c., Mar. 9	2.249c., Jan. 4
1936	2.249c., Dec. 28	2.016c., Mar. 10
1935	2.062c., Oct. 1	2.056c., Jan. 8
1934	2.118c., Apr. 24	1.945c., Jan. 2
1933	1.953c., Oct. 3	1.792c., May 2
1932	1.915c., Sept. 6	1.870c., Mar. 15
1931	1.981c., Jan. 13	1.883c., Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

High		Low	
\$22.61, Sept. 19		\$20.61, Sept. 12	
23.25, June 21		19.61, July 6	
23.25, Mar. 9		20.25, Feb. 16	
19.73, Nov. 24		18.73, Aug. 11	
18.84, Nov. 5		17.83, May 14	
17.90, May 1		16.90, Jan. 27	
16.90, Dec. 5		13.56, Jan. 3	
14.81, Jan. 5		13.56, Dec. 6	
15.90, Jan. 6		14.79, Dec. 15	
18.21, Jan. 7		15.90, Dec. 16	
18.71, May 14		18.21, Dec. 17	

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

High			Low		
\$21.17,	Dec.	3	\$16.04,	Apr.	9
22.50,	Oct.	3	14.08,	May	16
15.00,	Nov.	22	11.00,	June	7
21.92,	Mar.	30	12.92,	Nov.	10
17.75,	Dec.	21	12.67,	June	9
13.42,	Dec.	10	10.33,	Apr.	29
13.00,	Mar.	13	9.50,	Sept.	25
12.25,	Aug.	8	6.75,	Jan.	3
8.50,	Jan.	12	6.43,	July	5
11.33,	Jan.	6	8.50,	Dec.	29
15.00,	Feb.	18	11.25,	Dec.	9
17.58,	Jan.	29	14.08,	Dec.	3

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

PRICES of all steel products, excepting tin plate, were reaffirmed for the first quarter on Tuesday by Carnegie-Illinois Steel Corp. An announcement on tin plate will follow, but no change is expected. The announcement states that shipments after March 31 will be filled at the prices then in effect.

Production of coke pig iron in November (partly estimated) totaled 4,402,804 net tons compared with 4,447,366 tons in October, but on a daily average of 146,760 tons there was a gain of 2.3 per cent over the October daily average of 143,463 tons. The operating rate for last month was 97.2 per cent of capacity.

With November having attained an average of close to 97 per cent ingot production, it is now clearly established that the total for 1940 will be upward of 65,000,000 net tons of open-hearth and bessemer steel, surpassing the previous peak output in 1929 by more than 2,000,000 tons.

At the present rate of operations the steel industry could readily produce 80,000,000 tons of ingots during 1941, and under extreme pressure could, perhaps, produce close to 85,000,000 tons provided additional blast furnace capacity were made available. On Dec. 1 there were 201 coke furnaces in blast out of a possible 228. Of the 27 idle furnaces, some are being made ready, while others could be operated after necessary repairs if a supply of coke were assured. Marginal pig-iron producers assert that they could not operate at present costs without higher prices for iron.

RECURRENT talk of a "steel shortage" finds no substantiation in the steel industry itself or among its customers. A careful check fails to reveal a single instance of importance in which either a defense plant or a non-defense plant has been affected in its operations by lack of steel. On the contrary, nearly all steel consumers are now comfortably situated as to inventories, and, while deliveries are extended on nearly all products, complaints of steel companies' service are no more common than would occur under normal conditions.

Whatever delays there may be in the national defense program are not the result of inability of the steel industry to furnish its products as required, but are due to other conditions, such as frequent changes of designs and specifications for ordnance materiel, the time required for tooling up plants, and the redistribution and training of skilled labor on jobs with which it is not familiar.

The announcement by Bethlehem Steel Co. of an expansion program to cost \$18,000,000 demonstrates that the industry will do whatever may be necessary to meet the requirements of the defense program. Bethlehem's program will provide 850,000 tons ad-

• Carnegie-Illinois reaffirms steel prices for first quarter
... Pig iron production up slightly in November on daily basis ... 201 of 228 furnaces in blast ... Talk of "steel shortage" not borne out by facts ... Scrap prices advance.

ditional openhearth capacity, 800,000 tons of coke capacity and 700,000 additional pig-iron capacity annually. Six new openhearth, two new batteries of coke ovens and two new blast furnaces will be added, with two furnaces to be rebuilt and enlarged. Part of the improvements will be completed in six months and the remainder within a year.

The iron ore supply probably will be sufficient for maximum iron melting, but there may be little left over at the opening of navigation in the spring despite a Lake Superior movement of 63,709,152 gross tons up to Dec. 1, third largest in history. Blast furnaces are now consuming more than 6,000,000 tons a month and additional furnaces will be brought in before spring.

A LITTLE of the heavy pressure which prevailed during the last half of October and the first half of November has been relieved, but whether this is a temporary situation cannot yet be stated. Some companies had less tonnage in the last half of November than in the first half, but November orders as a whole were equal to or surpassed October bookings by a small margin, 10 to 15 per cent in certain cases.

Fabricated structural steel, which has been one of the most active items, has fallen into a slump this week, though this also may be a temporary situation. Bookings were less than 15,000 tons and new projects are only a little over 13,000 tons. In October, however, the structural steel fabricators had the largest business since April, 1931, the American Institute of Steel Construction reporting for its members a total of 233,115 tons in new contracts, which was 73 per cent of the all-time monthly record of 319,550 tons in October, 1929.

Advances in scrap prices have occurred on almost a country-wide basis. THE IRON AGE scrap composite price is up 17c. to \$21.17. In several centers not included in this composite No. 1 heavy melting steel has gone up 50c., while at Birmingham the advance is \$1.

The Industrial Pace . . .

FOLLOWING A SLIGHT SET-BACK in the previous week, activity in the durable goods industries, as measured by THE IRON AGE index of capital goods, showed a moderate gain in the past week, moving up 5.2 points. Gains in three of the components were responsible for the advance, although the most prominent increase was registered by the lumber carloading series, which pushed upward 19.2 points. Steel ingot production and automobile assemblies advanced less than seasonally, despite the fact that primary operations in the former industry were at an all-time high of 97.5 per cent of capacity. The composite for the week was 126.2, as against 121.0 in the preceding week, 117.4 a month ago, and 101.6 in the week ended Dec. 2, 1939.

Adhering to high levels against a declining seasonal trend, the component measuring shipments of forest products stood at 89.1 for the week, 27 per cent above the previous week's figure, 69.9, and comparing with 80.8 in the week ended Nov. 2, 75.7 in the corresponding week of 1939, and 112.9 in the comparable period of 1929. In the past week loadings totaled 39,083 cars, compared with 35,814 cars in the week previous.

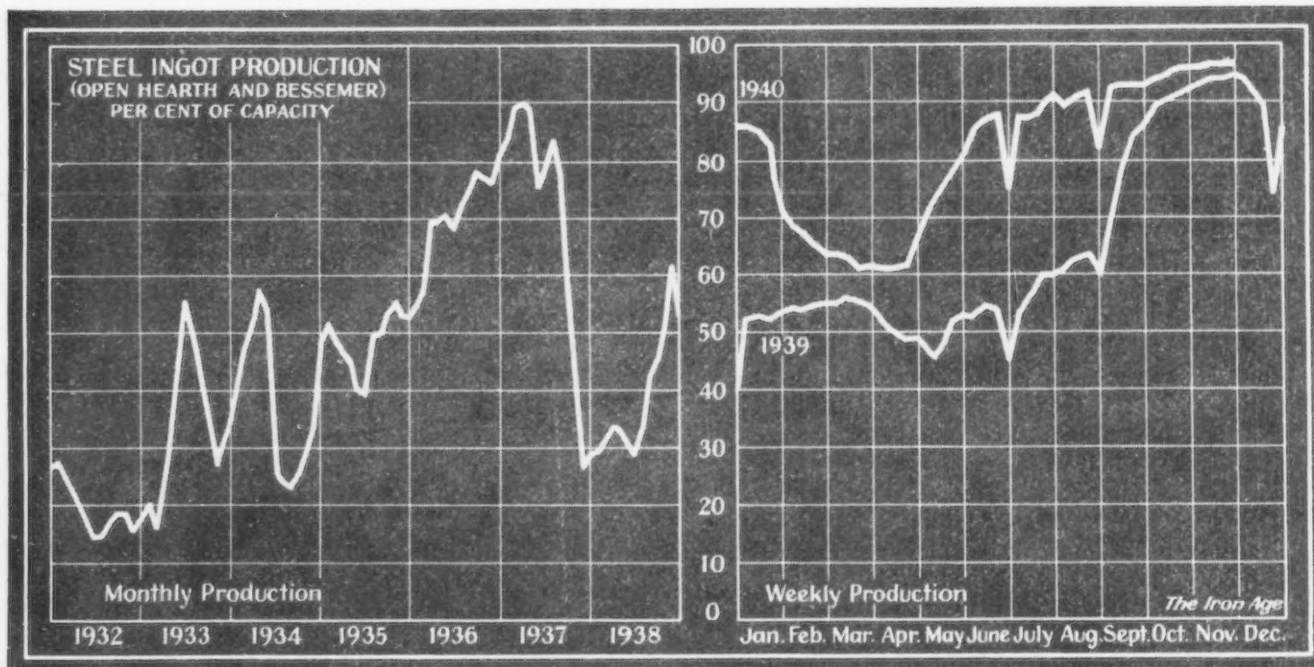
The heavy engineering construction series reached 126.2 in the week, a 5.1 point rise over the preceding week. A month ago the component was 117.4, and in the comparable week of 1939, 101.6. Contracts awarded in the past week totaled \$89,303,000, a 55 per cent increase over the corresponding 1939 week, and comparing with \$74,657,000 in the previous

week. The gain was due to a sharp advance in privately financed construction, which rose from \$13,958,000 to \$32,378,000. Public awards were off to \$56,925,000 from \$60,699,000. Among the larger contracts were \$8,000,000 for an aircraft plant at Buffalo, \$6,931,000 for a canal project in South Carolina, and \$4,889,000 for a dam and spillway in Kansas.

VOLUME OF NEW ORDERS received by manufacturers in October was 12 per cent heavier than that of September, and 23 per cent ahead of October, 1939. The October index stood at 180, highest peak in its history, and compared with 161 in September, and 146 in October, 1939. Most of the advance was due to heavier commitments in the producers' goods industries, largest increases being reported in the automotive, electrical, railroad, and office equipment, and iron and steel, metal products and paper industries. Orders in most of the above industries are well above those of a year ago.

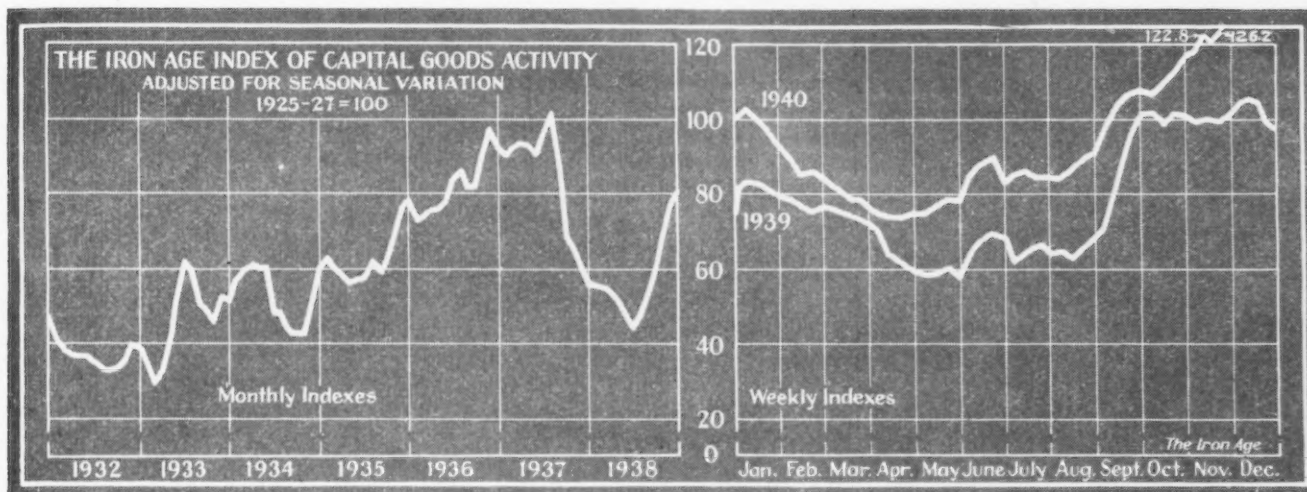
Accelerated inventory accumulation by manufacturers in September did not show much further progress in October. The index increased only 0.2 per cent in the month to 135.8, 18.6 per cent higher than October, 1939. Increases over last year's stocks have been heaviest in railroad equipment, because of large defense orders, although inventories in all the heavy industries have shown gains. During October the building and railroad equipment, the non-ferrous metal and paper industries were most active in building reserves.

Ingot Output Continues at 97%



District Ingot Production, Per Cent of Capacity	Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern River	S. Ohio	Western	St. Louis	Eastern	Aggregate
Current Week	97.0	99.0	96.0	94.0	93.0	106.0	104.0	95.0	109.0	98.0	76.0	102.5	80.0	97.0
Previous Week	97.0	99.5	97.0	94.0	91.0	106.0	104.0	95.5	109.0	102.5	76.0	102.5	83.0	97.5

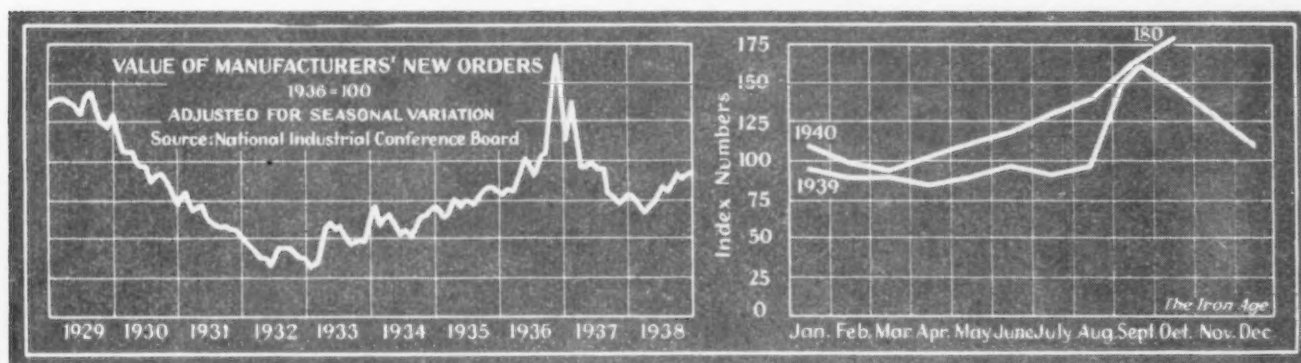
Upward Movement Resumed By Capital Goods Index



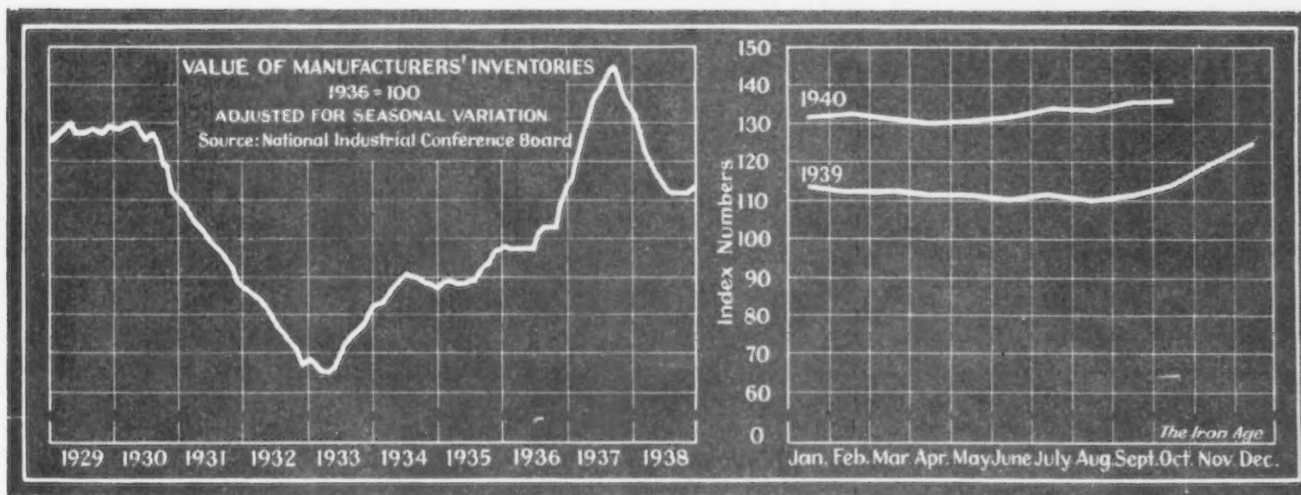
Component	Week Ended	Nov. 30	Nov. 23	Nov. 2	Dec. 2	Nov. 30
Steel ingot production ¹		145.4	145.7	139.3	140.7	99.8
Automobile production ²		124.7	126.7	116.4	89.1	60.6
Construction contracts ³		149.2	143.8	136.8	81.0	108.8
Forest products carloadings ⁴		89.1	69.9	80.8	75.7	112.9
Pittsburgh output and shipments ⁵		122.8	118.9	113.7	121.6	104.7
COMBINED INDEX		126.2	121.0	117.4	101.6	97.4

Sources: ¹THE IRON AGE; ²Wards Automotive Reports; ³Engineering News-Record; ⁴Association of American Railroads; ⁵University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended Nov. 23. Other indexes cover week of Nov. 30.

Manufacturers' Orders In October Up 12%



Little Change Shown In Inventories During October



Market News

...THE WEEK'S ACTIVITIES IN IRON AND STEEL

Prices

... *Announcements for first quarter expected soon*

Carnegie-Illinois Steel Corp. has reaffirmed present prices on major steel products for first quarter delivery and under date of Dec. 4 made the following release—

"Pittsburgh, Dec. 4—Carnegie-Illinois Steel Corp. announced today reaffirmation of its present base prices on hot rolled carbon steel, semi-finished material, bars, structural shapes, plates, steel sheet piling, hot and cold rolled sheets, hot rolled strip and standard rails, as well as all hot rolled alloy steel items, all for shipment to and including March 31, 1941 for delivery and consumption in the United States. In this announcement it is stated that prices will apply only on such shipments as are made up to and including March 31, 1941 and that any shipments after that date will be billed at prices then in effect."

It is expected that a separate tin plate announcement will be made some time this month and indications are that no change will be made at that time.

New Business

... *Slight decline in order volume probably of no significance*

A slight decline in the volume of incoming steel business at PITTSBURGH in the past two weeks undoubtedly had its origin in the observance of Thanksgiving holidays throughout the country and it is too early to determine whether the lessening in demand represents an actual trend. Specifications from the British during the remainder of this month are expected to be exceptionally heavy and shipments in December and January may approximate the record levels established last July, when 600,000 or more tons of steel was shipped to the British.

The total backlog of steel business at PITTSBURGH approximates two and a half months and orders

in the past week were still being received in excess of shipments and production. November bookings in the aggregate ran about 12 to 14 per cent ahead of October volume.

Chicago mills closed November either on a par with October or about 10 per cent below. The last two weeks in October and the first two in November set a very heavy pace which fell off in the latter part of the month. Several producers found November to be almost equal to the preceding period. New business is still coming in ahead of shipments but no pronounced lengthening of deliveries was noted during the past week. One mill announced a reduction of one week on wide strip.

Although automotive buying has slowed down, the demand for flat rolled products continues, bolstered principally by household appliance manufacturers. A change in the character of construction business from that of large projects to smaller and more diversified orders has been noticed. Alloy orders are well diversified. Structural shapes and plates continue at very strong levels. Concrete bars are one of the few items in that district which are slowing up. Buying remains orderly and customers' inventories still average between three and four months.

Principal types of alloy steel are virtually sold out for first quarter at CLEVELAND, and customers are finding it difficult to place popular sizes and grades of merchant bars, wire rods or semi-finished steel for delivery in the next quarter. Some mills are booked solidly into February on sheets. Aggregate November orders at CLEVELAND and YOUNGSTOWN exceeded the October volume but in some lines the extended delivery situation is becoming a brake.

Most producers are reserving space on their books for emergency business which may arise from the government defense program. Priority orders now comprise the bulk of the new business in alloy steel.

Shortages of raw materials are felt in varying degrees throughout the steel industry and mills are attempting to trade or purchase from

each other to a greater extent. Zinc is particularly difficult to obtain. Iron ore supplies are in good shape at the moment but it is considered likely that before long certain grades needed for blending will be keenly sought. Coke continues in a very tight situation. Adding to production costs are scattered cases involving equalizing or adjusting wage scales.

New orders received at BIRMINGHAM last week showed little change in volume from record bookings of October and the first three weeks of November. Backlogs at structural plants continue to mount with additional activity expected to result from both government and private building in the South.

November orders at most EASTERN PENNSYLVANIA mills exceeded October levels, although in some instances the margin was not as wide as in the previous month, due principally to a few very purchases in October. All markets continue to show very strong support. The pipe market was strengthened considerably in the month.

With November shipments at BUFFALO hitting the highest monthly level of 1940 deliveries extended another two to three weeks for several items, the steel business in that area is expected to establish an all-time high this year. The area's largest producer cannot guarantee delivery on bars before the second week of February, and this is despite the fact that it opened its \$4,000,000 new bar mill just three weeks ago.

Steel Operations

... *Ingot rate remains unchanged at 97 per cent*

Minor fluctuations in ingot production in various districts do not materially change the rate for the entire industry remains this week at 97 per cent. Losses in production are mainly due to furnaces going out for repairs while gains come when furnaces go in again. Under present conditions these fluctuations are bound to occur with regularity.

Pig Iron

... Shipments continue in excess of merchant output

• • • **High spots** of the pig iron situation are these: Shipments continue in large volume, generally in excess of merchant production, thereby bringing about a reduction in stocks at producers' plants. There is a shortage of iron but no actual scarcity. Producers are keeping their regular customers supplied, but are guarding against over-stocking by foundries so far as possible. While major producers for the market, such as the steel companies, probably will not advance prices for the first quarter, this situation will not be satisfactory to some of the independent merchant producers, particularly those facing higher costs for coke. If additional merchant production becomes necessary to the extent that long-idle furnaces are brought into blast, higher prices probably will be quoted at least by these marginal producers.

CLEVELAND reports that the number of foundries now on a six-day operating basis has grown rapidly recently. Producers' inventories continue to dwindle, making it increasingly difficult for melters to obtain preferred analyses for certain production. CLEVELAND reports two stacks will probably resume in late December and another is scheduled to come into blast in about two and one-half months. However, one stack in the Valley is being taken off for repairs.

Shipments continue at record levels from PITTSBURGH. The time is drawing near when some decision will have to be made on first quarter pig iron prices. Merchant producers who are paying higher prices for beehive coke insist they must get more for their pig iron in the first quarter. Large integrated steel mills having captive mines and by-product coke plants, can point to no general increase in raw material costs which would justify advancing their pig iron prices, at this time at least.

Capacity merchant iron production at BIRMINGHAM, with an undiminished flow of shipments, reflects continued heavy demand by cast iron pipe manufacturers, stove and commercial foundries.

Shipments of pig iron to melters

in the ST. LOUIS area for November were considerably ahead of October, and the prospects are that December will be the best of the year.

Shipments of iron in the PHILADELPHIA district during November were very heavy, running from 30 to 100 per cent in excess of October. Extreme tightness of available supplies continues. All types of iron, including even the less desirable grades, have found ready takers.

Buffalo pig iron consumers generally have increased shipping instructions considerably within the last two weeks. Shipments in November reached the highest level of the year, though only slightly ahead of October. U. S. Navy orders account for approximately 33 per cent of the total production of the Worthington Pump & Machinery Corp.'s Buffalo plant. Included among recent orders are air compressors for charging torpedoes and for other uses on naval craft.

Iron Ore

... Lake Superior vessel movement third highest in history

With the season practically ended, vessel shipments of Lake Superior iron ore totaled 63,709,152 gross tons up to Dec. 1, third highest in history by virtue of full-speed operations since mid-summer. The 1940 movement is exceeded only by 1929 when 65,204,600 tons were moved and 1916 when vessel shipments totaled 64,734,000 tons. The 1940 cumulative total is 18,642,977 tons ahead of the 1939 season to Dec. 1.

Last month's shipments at 5,412,798 tons fell 59,807 tons short of the amount moved in November, 1939. The figures include small amounts of Canadian ore which up to Dec. 1 amounted to 356,384 tons this year.

The final grand total figure for 1940 will be augmented by tonnage moved by all-rail, and by the December vessel movement which will be very small this year.

With over 6,000,000 tons of ore per month being consumed now by furnaces dependent principally on Lake Superior ore, and with additional stacks scheduled to come into blast, only a very small amount of ore will be on hand at furnaces and Lake Erie docks when the 1941

navigation season opens next April.

The Great Lakes vessel fleet hauled a record-breaking amount of coal during the 1940 season. At the end of November around 45,500,000 net tons of bituminous cargo coal had been dumped.

Semi-Finished Steel

... Sales held in check only by availability of supplies

The November volume at Pittsburgh topped October sales and was held in check only by the availability of supplies. All grades of semi-finished steel are moving briskly with heavy British specifications for billets noted in the past two weeks. The Japanese purchased about 30,000 tons of ingots last week and were in the market for an additional 15,000 tons of bars.

At CLEVELAND, aggregate November sales of semi-finished steel were below the October level, indicating the desire of producers to conserve supplies necessary for their own use. At Youngstown one producer is attempting to build up a stock of semi-finished sufficient to carry over a short repair period.

Structural Steel

... Fabrication awards lowest since July

Fabricated structural steel awards of 14,625 tons are the lowest since the second week in July. The largest lettings are 5250 tons for a Mississippi River bridge at Jefferson Barracks, Mo.; 1500 tons for the Danly Machine Specialties Co., Cicero, Ill.; 1150 tons at Jefferson Island, La., for rebuilding the salt mining, storage and distributing plant of the Jefferson Island Salt Co.; 1050 tons for a plant building at Mesena, N. Y., for the Aluminum Co. of America, and 1000 tons for an extension to an electric furnace building at Canton, Ohio, for the Republic Steel Corp.

New structural steel projects are also lower at 13,225 tons against 36,225 tons last week. The only sizable inquiries are 2800 tons for a bridge over the main channel at Winona, Wis., and 2700 tons for an airplane repair shop for the air corps at Hill Field, Ogden, Utah.

Sheets and Strip

... Some mills heavily sold into the first quarter

Even though total sheet bookings at PITTSBURGH during the last half of November did not match the pace set in the early part of the month, the order volume is none the less substantial. Six to eight week promises are common and demand

from automobile makers, refrigerator manufacturers, and the miscellaneous trade is holding at recent levels.

A CHICAGO producer has again extended deliveries on strip, 2½ in. and under, to four to five weeks and reduced deliveries on wide strip, 2½ in. to 8 in., from six to eight weeks to five to seven weeks. Household appliance manufacturers furnish a steady demand for flat rolled

products and defense business is growing.

Sellers at CLEVELAND report no slackening in forward buying. Hot rolled capacity of one YOUNGSTOWN producer is fully engaged through February. Stainless and commodity strip are among the items most greatly extended on delivery promises, which in some instances have been as far off as 24 weeks. At CLEVELAND it is reported the necessary equipment has been bought for the new stainless production facilities of the leading producer and construction is being rushed.

Activity in Southern Ohio continues for the fourth consecutive week at near to 150 per cent of mill capacity. Analysis of orders received indicates that bookings are well divided and show a consistent demand from all parts of the country.

Merchant Bars

... Demand unabated and mills are heavily sold ahead

With the base still broadening, demand for hot rolled bars at PITTSBURGH continued unabated in the past week and it is believed that all previous production records were broken in November. Deliveries remain extended, with March and April promises not unusual, at least on some sizes.

At CHICAGO, both alloy and carbon bars set the pace in new business. Deliveries on carbon bars were extended this week by one mill from four to 10 weeks up to eight to 10 weeks, and longer if heat treating is called for. On shell, artillery, fuse, bomb and bomb fins, small arms and military vehicle orders already placed in that district, CHICAGO mills will realize about 109,300 tons of steel. More, naturally, is expected later on when the full impact of the defense program is felt.

November specifications at CLEVELAND were approximately 30 per cent ahead of those of October. The influx during the past few weeks has been very heavy. One YOUNGSTOWN mill is reported nearly sold out for first quarter. Analysis of mill schedules shows that, while small mills are heavily loaded and large mills are well booked on shell steel, considerable capacity exists on intermediate mills which may be

DINGS MAGNETIC DRUMS

to remove iron
from foundry sand...
no conveyor belt necessary

DINGS High Intensity Magnetic Drums are designed to remove iron from foundry sand when it is impractical to carry it on a conveyor belt and pass it over a magnetic pulley. These separators, consisting of powerful magnetic coils surrounded by a revolutionary tubular shell meet all demands for an economical stationary installation with sufficient capacity to handle large quantities of sand per hour, and enough power to extract all the iron.

A large automotive foundry recently installed three Dings Magnetic Drums with outstanding success after finding that pulleys or pulley type separators would be impractical for the following reasons: hot sand would make belting costs excessive; their handling setup includes an apron conveyor which they did not wish to remove as would otherwise have been necessary.

The drums installed in this plant are removing everything from fine shot up to 6" chunks of iron. The drum coils are wound with glass wire to resist heat and for strength and the shells are made of stainless steel to resist abrasive action of the sand.

What conditions must be met by a separator in your plant? Write to Dings today for complete details on the unit that will meet your individual needs.

DINGS MAGNETIC SEPARATOR CO.
Milwaukee, Wis.
535 Smith St.

Complete line of magnetic separators for removing iron from sand, slag, refuse and for separating ferrous and non-ferrous scrap. High Intensity Lifting Magnets for economical metal handling.

Illustrating the principle of operation of the Magnetic Drum. Sand passes over drum in normal trajectory while iron is attracted and held to revolving shell until it passes underneath and out of magnetic field where it is discharged.

Dings
MAGNETIC
SEPARATION

HIGH
INTENSITY

able to handle diverted tonnages. Thus, some specifications may be rolled and shipped earlier than present promises indicate.

The Bureau of Supplies and Accounts, Navy Department, will open bids Dec. 13 on 2500 tons of hot rolled 2½-in. nickel steel bars for delivery at the Boston yard. The material is wanted for the manufacture of chain.

Reinforcing Steel

... Awards 5600 tons ... New projects 8710 tons

Among reinforcing steel awards of 5600 tons, the only large letting is 2000 tons for the superstructure of the Ford Motor Co.'s aircraft engine plant at Dearborn, Mich., the Ford company to roll and furnish the material to the contractor.

New reinforcing steel projects call for 8710 tons and include 3000 tons for a government office building at Arlington, Va., and 2000 tons at Camden, N. J. for shipways for the New York Shipbuilding Corp.

Wire Products

... Rods well sold up through the first quarter

With extended promises prevailing on practically every wire item, PITTSBURGH reports bookings in the past week to be about equivalent to those placed in the week before. November sales were in excess of those placed in October.

CLEVELAND and YOUNGSTOWN wire rod mills are now reported well booked up for first quarter. All producers are maintaining an emergency reserve and are still able to furnish small amounts when badly needed by regular customers. An important factor entering into the situation for first quarter is the expectation that wire mill operations will expand, requiring more raw material. Each week recently operations on manufacturers' wire have risen. Merchant wire production is gaining but remains the lowest in actual operations. It is estimated total new business during November edged ahead of the average of the two previous months.

Bolts, Nuts and Rivets

... Backlogs sufficient for good operations this month

Although bolt and nut orders at CLEVELAND fell off 10 days in the middle of November, volume staged a comeback toward the close of the month. Backlogs are sufficient to insure good operations in December, and from all indications sales

will be above normal for the month. Producers report increasing difficulty in securing specific sizes in rods and bars. For rivet producers, November new tonnage made a peak on the upward movement of the past six months but fell behind the abnormally high volume of November, 1939. The outlook for early December is described as "promising."



A STAINLESS "SUCCESS STORY" ...from fabricator to chef

• Here indeed is a chef's inspiration for fine cooking; and a thrifty manager's delight. Nearly everything in the modern kitchen of this new metropolitan cafeteria is made of glistening ARMCO Stainless Steel.

These food storage compartments and work tables are a good pictorial story of the uniform forming and welding qualities of ARMCO Stainless. Any fabricator would be proud of their efficient design.

Your needs may be far removed from spic-and-span kitchens; yet it's likely you can benefit in some way from using ARMCO Stainless Steels. You may

not be seeking sanitation or even the inviting appearance of an ever-bright finish. You may in fact want grades for he-man jobs where corrosion and heat-resistance are most important. *Whatever* your requirements, you can be sure of the excellent fabricating qualities of this rustless metal.

Just let us know what you make or intend to make. We'll tell you frankly whether ARMCO Stainless can help you achieve shop savings and more durable or saleable products. Write to: The American Rolling Mill Co., 1250 Curtis St., Middletown, O.



ARMCO STAINLESS STEELS

Warehouse Business

... Sales from stock aided by long mill deliveries

Chicago warehouses find the usual "seasonal slump" from Nov. 15 to Jan. 15 less in evidence due to the widespread influence of the defense program. Ordinarily, heavy structural shapes and plates fall off

sharply in mid-November but they have so far kept up at high levels. Business for 1940 to date is ahead of 1939, but comparing fourth quarters of this and last year finds 1940 about equal or off slightly.

At CLEVELAND, the November movement exceeded that of October with cold rolled bars, alloy steel and plates most prominent. Deliveries

from the mills on some alloys are far from satisfactory, since orders placed as long as three months ago are reported still unshipped.

Warehouse business in ST. LOUIS has increased sharply as deliveries from mills become more extended. Plates, structurals and hot rolled sheets form the bulk of the business.

Warehouse business at PITTSBURGH in November ran from 15 to 20 per cent in excess of October bookings. Demand remained widely diversified with light structural shapes leading the list. Warehouses note an increase in requirements from steel consumers who are unable to get specific sizes of products from the mills.

On a day-to-day basis, Philadelphia warehouses, offered all the business they could handle, reported November orders in excess of even heavy October volume, one house having had the best month in its history. Structural shapes were in the heaviest demand, followed by specialties, including tubular goods, alloy steel, bars and plates.

Tubular Goods

... Preferential discount of 5% to jobbers withdrawn

The extra 5 per cent, which has been granted to some merchant pipe jobbers, was to be withdrawn early this week, thus tightening up the price situation on standard pipe and bringing going prices in line with the actual card, which allows jobbers a 5 per cent discount from the consumer price. Oil country goods demand continues relatively slow, whereas specialty tubing requirements remain brisk.

Shipbuilding

... Cramp shipyard to build six Navy cruisers

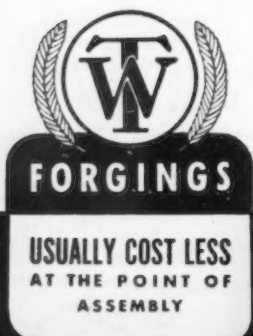
Cramp Shipbuilding Co., Philadelphia, has been awarded a Navy Department contract for the construction of six cruisers to cost \$113,822,280. Approximately 30,000 tons of steel will be required.

The company was also given a contract for the expansion of its plant facilities to cost \$9,500,000. Total cost of facilities, including additional shipways, cranes, outfitting piers, machine shops, pipe

YOUR RISK in buying forgings

To produce forgings to your specifications may not be difficult. But no source can, or will, assume your share of responsibility for the cost of forgings at the point of assembly. A source of supply for forgings has no obligation to you beyond supplying forgings to your specifications. Whatever you get beyond what the specifications call for is a risk that you assume. There are tangible, measurable differences in forgings—differences beyond what the specifications call for. It is the presence of these differences in T & W forgings that protect you from an excessive cost at the point of assembly—from a higher cost for machining and finishing. T & W forgings usually cost less at the point

of assembly. Ask a T & W forging engineer for proof that there are differences in T & W forgings, beyond what the specifications call for.



TRANSUE & WILLIAMS
STEEL FORGING CORPORATION
ALLIANCE, OHIO

Sales Offices: New York, Philadelphia, Chicago, Indianapolis, Detroit and Cleveland

shops and tools, is not to exceed \$12,000,000.

The Maritime Commission has called for bids to be opened Dec. 23 for the construction of two marine transports. Details on tonnages were withheld at the request of the Navy Department.

The Maritime Commission on Tuesday invited bids for Dec. 9 on the construction of one C-2 cargo ship to be built for the Grace Lines. Approximately 3600 tons of steel will be required.

Tin Plate

... Operations off slightly ...
Further decline likely

Tin plate mill operations are estimated this week at 49 per cent, down one point, incoming business is no better than a week ago, export demand continues in the doldrums, and the majority of activity is centered on requirements from small miscellaneous tin plate users.

Railroad Buying

... Three roads buy 55,300 tons of rails ... 19 locomotives to be built

Rails figure prominently in railroad orders this week, a total of 55,300 tons being ordered.

Chicago Great Western bought 3000 tons of rails from Carnegie-Illinois Steel Corp. and 500 from Inland Steel Co. Subject to court approval, the New York, New Haven & Hartford has split 15,000 tons between Carnegie-Illinois and Bethlehem. Santa Fe ordered an additional 21,000 tons of rails from Colorado Fuel & Iron Corp. and 13,800 tons from Carnegie-Illinois.

Locomotive orders in the main consists of Northern Pacific's purchase of eight 4-8-4-type from Baldwin Locomotive Works and six articulated units from American Locomotive Co. Norfolk & Western ordered five 4-8-4-type locomotives from its own shops at Roanoke, Va. Diesel switchers are on order for Kewaunee, Green Bay & Western and the New Haven with American Locomotive and General Electric. Southern split an order of four diesel-electric streamliners of 4000 hp. between the Electro-Motive Corp. and American Locomotive Co.

American Car & Foundry Co. received orders from the Illinois

Terminal Railroad for 250 box cars and from Norfolk & Southern for 50 all steel gondolas of 50 ton capacity, and also an order from the Solvay Process Co. for five 70-ton 10,000-gal. tank cars and four multi-unit tank cars of 40 tons.

Plates

... Backlogs mounting steadily and deliveries lengthen

Plate deliveries at PITTSBURGH

have become more extended, incoming business is still strong, and national defense requirements indicate capacity plate operations for some time to come. Additional support will also emanate from the British shipbuilding projects to be carried out in this country.

Fresh plate bookings in the PHILADELPHIA district in November were in excess of shipments, and in some cases ran in excess of October.



... OR "KNOCKOUT"?

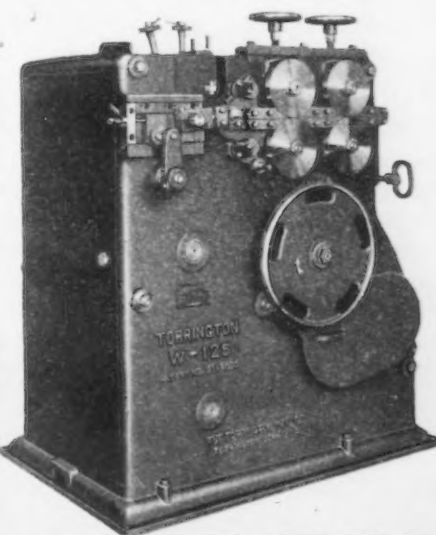
If you are in the dark with respect to greater accuracy and increased production, investigate Torrington Spring Machines. Torrington guaranteed production figures will bring "knockout" results.

Torrington Spring Machines are of extra-heavy, rigid construction ... compact design ... with easily adjusted and conveniently located controls. Timken bearings are used throughout. Springmakers everywhere are discovering that Torrington Spring Machines meet their every demand ... exactly.

Investigate NOW what Torrington Spring Machines can do for YOU in stepping up production, accuracy ... and PROFITS.

SINCE 1937 TORRINGTON HAS BUILT AND SOLD MORE AUTOMATIC SPRING COILING MACHINES THAN ALL OTHER MANUFACTURERS COMBINED.

Spring Making Machines by
TORRINGTON
THE TORRINGTON MANUFACTURING CO. of TORRINGTON, CONNECTICUT



Machine Tools

... SALES, INQUIRIES AND MARKET NEWS

Parts Plants Are Expanding

Detroit

• • • Manufacturers of special machinery are reporting increasing difficulty in obtaining units that they must purchase or have manufactured on a sub-contract basis. Manufacturers of welded machine bases, for instance, are reported to be at least four weeks behind on their estimating, plus being many weeks behind on delivery.

Recent weeks have seen a flood of new projects for expansion of the supplying plants around Detroit. One of the most recent is City Pattern Works, which is expending \$50,000 for new equipment in a plant addition that will include a machine shop for pattern work, a core room and an aluminum foundry. The Wayne division of Bendix Aviation Corp. is being

tooled to manufacture airplane carburetors and landing struts, with production scheduled to be started in February or March. Willys-Overland Motors, Inc., at Toledo, is said to require 100 milling and forging machines for ordnance work.

Continental and Ford are standardizing engine design for the 1/4-ton midget army truck which is now being ordered in quantity. Spicer Mfg. Co., Toledo, is reliably reported to be starting now to add \$500,000 in tooling for the manufacture of axles for these midget, four-wheel drive vehicles.

Bookings Past July, 1941

Cincinnati

• • • The district machine tool market is without new feature. New business continues to flow in

a steady and brisk manner, with virtually all plants now booking in the second half of 1941 and a few even beyond that period. The Cincinnati Shaper Co. announced work on a new heat-treatment building which will assist this company in increasing its production.

No Let-Up in Orders

Chicago

• • • The flow of machine tool orders in this section shows no signs of diminishing. Deliveries remain the dominant problem, with manufacturers sold out for at least the first six months of 1941, and many cases are reported of production schedules booked up for practically the entire ensuing year.

November Sales Volume Dropped

Cleveland

• • • Orders fell off rather sharply here in late November for producers and dealers. Aggregate bookings in the district were probably 25 per cent below the October volume and 50 per cent below September. But still, from the producers' standpoint, November business was as high as 50 per cent over capacity for early months of 1941, taking into consideration probable increases in capacity.

Inquiries Heavy in New York

• • • New order volume continues above current shipments, but is not up to the level of October when the \$20,000,000 Wright Aeronautical program was being completed. Buying on the part of aircraft instrument companies, which ran heavy last month, has tapered also. Shipyards, supplied with federal funds for expansion of ways and shop facilities, are still in the market. Inquiries are at a higher level, indicating bigger buying to come. The largest inquiry out at the present time, from E. W. Bliss Co., Brooklyn, is for about \$2,000,000 worth of machine tools to be used for torpedo production for the British.

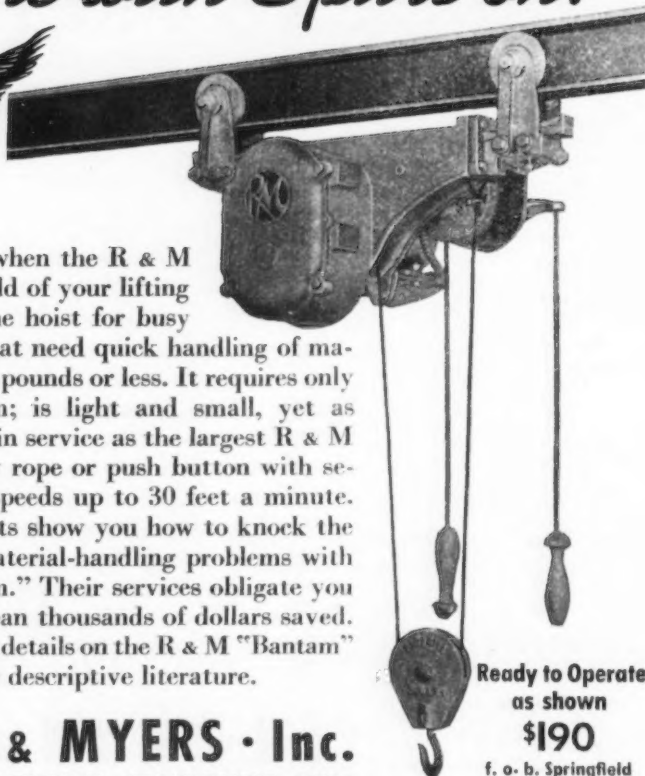
THE R & M "BANTAM" HOIST *is there with Spurs on!*



YOU get action when the R & M "Bantam" takes hold of your lifting problems. Here's the hoist for busy production shops that need quick handling of materials weighing 500 pounds or less. It requires only 13 inches headroom; is light and small, yet as rugged and reliable in service as the largest R & M hoist. Controlled by rope or push button with selection of hoisting speeds up to 30 feet a minute.

Let R & M experts show you how to knock the feathers off your material-handling problems with the R & M "Bantam." Their services obligate you in no way—may mean thousands of dollars saved. Or have a look at the details on the R & M "Bantam" by writing today for descriptive literature.

ROBBINS & MYERS • Inc.
HOIST AND CRANE DIVISION • SPRINGFIELD, OHIO



Ready to Operate
as shown
\$190
f. o. b. Springfield

Non-Ferrous Metals

... MARKET ACTIVITIES AND PRICE TRENDS

New York, Dec. 3—All major non-ferrous markets, for one reason or another, took on a quieter tone in the past week. Settling down in the lead market was reflected by two downward price revisions during the week, totaling \$6 a ton. Zinc consumers were forced into a continuance of comparatively light activity by scarcity of supplies. Tin buyers failed to show any revival of interest in the week, although the market was off further.

Sales of electrolytic copper were in fairly good volume through the early part of the week, but tapered off toward the end. Apportioning procedures were still being practised by producers as supplies continued fairly tight. All major factors remained at the level of 12c. a lb., delivered Connecticut Valley. Custom smelters asked 12.25c. for December and 12.125c. for first quarter delivery, although sales in this direction were not large. Export buying was quieter than in the previous week, on the basis of 10c. to 11c. a lb., f.a.s.

Zinc

Increasing tightness in the supply situation has now reached an acute stage. Some large producers have completely sold out their available stocks, in addition to a large part of their production for a period extending well into next year. Deliveries on any considerable tonnages before February is next to impossible, and the great preponderance of recent bookings has specified shipment beyond that month. Most of the business has been placed on an average price basis. Reflecting this general picture, and running according to expectations were sales in the past week. Volume of prime Western bookings totaled 2332 tons, down considerably from the 6518 tons sold in the previous week. Shipments were 4723 tons, as compared with 5393 tons. Backlog of prime Western orders now totals 114,826 tons.

Lead

Continued light demand over the past two weeks brought a not en-

tirely unexpected reaction from producers in the past week when two price cuts were instituted in rapid succession by two of the large sellers. On Thursday prices were lowered \$3 a ton from 5.80c. to 5.65c. a lb. No apparent interest having been shown by consumers, principal factors again reduced the price by the same amount to a basis of 5.50c. a lb., delivered New York. As yet both reductions seem to have affected buyers very little, and the market continues comparatively quiet, the majority of sales being of the carload variety.

Tin

Prolonged dullness in the domestic market during the past week brought the price of prompt Straits metal gradually downward from 50.30c. on Wednesday of that week to 50.20c. a lb., delivered New York, today. Activity at that level

was just about at a standstill. Government buying in addition to a few consumer sales took place at the government buying level, to what extent is not known, but tonnages involved were relatively small. Heavy deliveries to this country recently are believed to have increased invisible stocks by about 35,000 tons.

November Averages

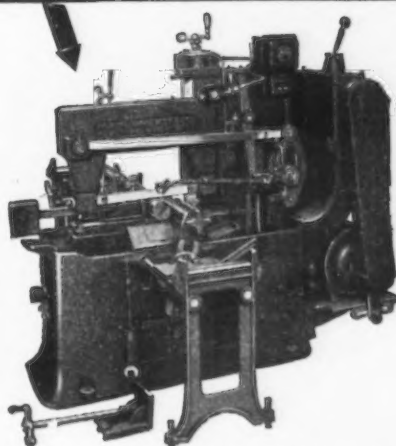
Average prices of the major non-ferrous metals in November, based on quotations appearing in THE IRON AGE, were as follows:

	Per Lb.
Electrolytic copper, Conn. Valley...	12.00c.*
Lake copper, Eastern delivery.....	12.00c.
Straits tin, spot, New York.....	50.572c.
Zinc, East St. Louis.....	7.25c.
Zinc, New York.....	7.64c.
Lead, St. Louis.....	50.58c.
Lead, New York.....	5.73c.

*Mine producers only.

(Non-ferrous prices on page 119)

The MARVEL 6A and 9A heavy duty ball-bearing SAWS are the FASTEST HACK SAWS built...



**for
Automatic
Production**

● MARVEL High Speed production of identical pieces (from long rifle barrels to thin gear blanks) is the fastest and most economical cutting-off method, because these MARVEL Automatic Saws require no more attention than any other automatic machine.

Heavily built, all ball bearing construction, unbelievably fast, these saws will produce more pieces floor-to-floor, than any other type of cutting-off machine. Write for Bulletin #600 for the many advantages of MARVEL Saws and how they can cut manufacturing costs for you.

Buy from your local distributor

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave.

Chicago, U.S.A.

Eastern Sales Office: 199 Lafayette St., New York

Scrap

...MARKET ACTIVITIES AND QUOTATION TRENDS

Advances in scrap prices this week are almost country wide. Prices have gone up on nearly all grades in Chicago, Youngstown, Cleveland, St. Louis, Cincinnati, Birmingham and Detroit, while in other centers prices are strong, though notably higher in only a few instances. No. 1 heavy melting steel is slightly higher at Pittsburgh and Chicago and unchanged at Philadelphia, the effect on THE IRON AGE scrap composite price being an increase of 17c. to \$21.17. At Cleveland, Youngstown and St. Louis this grade has gone up 50c. and at Birmingham \$1.

No new factors of great importance have entered the market except those associated with the weather. The closing of navigation on the Great Lakes has brought to an end the movement of scrap from upper Lake ports. An example of this is the receipt of 35,000 tons at Buffalo which has temporarily tided over the situation in that center and kept prices in check. Cold weather in some districts has impeded the flow of scrap to market.

Pittsburgh

The market remains strong, the dollar spread in No. 1 heavy melting has been eliminated and this grade is now quoted at \$22 to \$22.50, up 25c a ton from last week's average. Brokers are finding difficulty in picking up supplies, even though consumer transactions are not numerous. Railroad coil springs, leaf springs and rolled steel wheels were incorrectly quoted last week at \$27 to \$27.50. The correct quotation for the week of Nov. 26 should have been \$27.50 to \$28 a ton.

Philadelphia

Shipments to Philadelphia district mills from dealers' yards located within the city were complicated early this week when yard employees struck for wage increases. All yards within the city limits were affected, while interested parties met Tuesday to discuss the situation. Further market strength in the past week was reflected only in mixed yard cast, which moved up to a flat \$20. All other grades remained firm and steady. New buying was in about the same volume as the previous week. Scarcity of cast grades has slowed foundry shipments somewhat.

Chicago

On the basis of broker-mill transactions, No. 1 heavy melting steel is quoted this week at \$20.25 to \$20.75. There is not much being sold at this figure, for it is reported that brokers are paying this price too. The entire list continues on an exceptionally firm basis and prices generally moved up this week with little trading taking place.

Youngstown

The scrap situation appears to be becoming tighter in this area. There has been moderate activity on the part of mills, which is reflected in this week's 50c. rise in published heavy melting prices, to a range of \$22 to \$22.50 a ton. In order to cover some dealers have been forced to bid very high against outside districts.

Cleveland

No. 1 heavy melting steel is quoted up 50c. a ton to a range of \$21 to \$21.50 this week on the basis of recent purchases here. From all indications the market is much stronger than a few weeks ago. The principal local railroad list closing Thursday offers roughly the same amount of scrap as went last month.

Buffalo

With arrival in the past week of seven Lake boats carrying about 34,000 tons of scrap for delivery at Buffalo mills, the area's largest consumer has ordered shipments from local dealers held up for another week, extending the embargo from Dec. 2 to Dec. 9. The market here, however, appears to maintain its strong undertone. Some dealer sales of No. 1 cupola cast within the \$19 to \$20 range boost that item 50c. this week.

St. Louis

Dealers continue to move prices up 25 to 50c. a ton to cover their short interests. Country dealers say that receipts are light. Reports from Texas are that considerable material is awaiting ships for export to England, and that dealers are preparing scrap for shipment to northern markets within the next 30 days.

Cincinnati

Old materials in this area are strong. Mill interests with continuing contracts are specifying steadily with small indication of the building of inventories. Other users are in the market constantly for material with the result that dealers bids are up on all principal items 50c. Even on the increase, dealers indicate generally that prices are still nominal, since the active interest in scrap is making it worth practically whatever they can get for it.

Birmingham

No. 1 and No. 2 heavy melting steel advanced \$1 a ton here in the past week. This advance is expected to release tonnages which in the past had been moving to Gulf ports by reason of more favorable prices and freight rates. Stocks on dealers yards have been at a low level for weeks.

Detroit

December automotive lists showed a general increase in strength in scrap prices believed to be principally a reflection of strength in surrounding market areas. Even some of the cast grades which have been unchanged for many weeks show evidence of price improvement. However, these items, along with electric furnace scrap, brings mixed reaction from dealers indicative of some instability.

New York

Scrap prices are firm with constant heavy demand and a somewhat less easy supply situation. The export market is listless, although one or two shipments are reported. The demolishing of the Second Avenue elevated will be reconsidered when on Dec. 17 the Borough Council of Manhattan will accept offers from the wreckers.

Boston

Although there is little speculative buying, business is satisfactory. Blast furnace material consumers are in the market on a basis of \$9.25 a ton on cars, but little can be moved because of freezing weather. Eastern Pennsylvania consumers are buying turnings, for which brokers pay \$9.25 to \$9.50 a ton on cars, mostly \$9.50, and Nos. 1 and 2 steel is moving into that territory at former prices. Consumers are trying to buy bundled skeleton at a reduction of 50c. a ton, but holders are letting little go. Stove plate also is in demand from Pennsylvania as well as New England consumers, with \$13 a ton on cars the general going price.

Toronto

Severe weather in rural districts have hindered deliveries but supplies from Toronto and vicinity continued in good volume. Demands for all lines of scrap are insistent and dealers are hard pushed to meet current commitments. Greatly increased consumption is looked for after the turn of the year, and dealers may have to go further afield for supplies. Hamilton mills have been supplied recently from both Montreal and the United States. Unused scrap reserve in Western Canada will likely be drawn into the market soon, although this would call for freight concessions; for otherwise local prices would advance very strongly.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$22.00 to \$22.50
Railroad heavy mltng.	25.00 to 23.50
No. 2 heavy melting	20.00 to 20.50
Railroad scrap rails	23.50 to 24.00
Rails 2 ft. and under	27.00 to 27.50
Comp. sheet steel	22.00 to 22.50
Hand bundled sheets	21.00 to 21.50
Heavy steel axle turn	21.00 to 21.50
Heavy steel forge turn	20.00 to 20.50
Machine shop turnings	15.50 to 16.00
Short Shov. Turn. Alloy	
Free	17.00 to 17.50
Mixed bor. & turn.	15.00 to 15.50
Cast iron borings	15.00 to 16.00
Cast iron carwheels	22.50 to 23.50
Heavy breakable cast	17.50 to 18.00
No. 1 cupola cast	22.00 to 22.50
RR. knuckles & coup.	27.00 to 27.50
Rail coil springs	27.50 to 28.00
Rail leaf springs	27.50 to 28.00
Rolled steel wheels	27.50 to 28.00
Low phos. billet crops	27.50 to 28.00
Low phos. punchings	27.00 to 27.50
Low phos. heavy plate	25.50 to 26.50
Railroad malleable	25.50 to 26.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$20.50 to \$21.00
No. 2 hvy. mltng. steel	19.50 to 20.00
Hydraulic bund., new	20.50 to 21.00
Hydraulic bund., old	17.50 to 18.00
Steel rails for rolling	25.00 to 26.00
Cast iron carwheels	23.00 to 23.50
Hvy. breakable cast	17.50 to 18.00
No. 1 cupola cast	23.00 to 23.50
Mixed yard (f'd'y) cast	20.00 to 20.50
Stove plate (steel wks.)	18.50 to 19.00
Railroad malleable	22.50 to 23.00
Machine shop turn	14.50 to 15.00
No. 1 blast furnace	13.00 to 13.50
Cast borings	15.00 to 15.50
Heavy axle turnings	19.00 to 19.50
No. 1 low phos. hvy.	25.50 to 26.00
Couplers & knuckles	25.50 to 26.00
Rolled steel wheels	25.50 to 26.00
Steel axles	25.00 to 25.50
Shafting	25.50 to 26.00
Spec. iron & steel pipe	18.00 to 18.50
Cast borings (chem.)	15.00 to 15.50

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton	
Hvy. mltng. steel	\$20.25 to \$20.75
Auto. hvy. mltng. steel	
alloy free	19.25 to 19.75
No. 2 auto steel	17.00 to 17.50
Shoveling steel	20.25 to 20.75
Factory bundles	19.75 to 20.25
Dealers' bundles	18.25 to 18.75
No. 1 busheling	19.25 to 19.75
No. 2 busheling, old	11.50 to 12.00
Rolled carwheels	23.50 to 24.00
Railroad fir s. cut	21.00 to 21.50
Railroad leaf springs	23.50 to 24.00
Steel coup. & knuckles	23.50 to 24.00
Axle turnings	19.50 to 20.00
Coil springs	24.50 to 25.00
Axle turn. (elec.)	19.75 to 20.00
Los phos. punchings	23.50 to 24.00
Low phos. plates 12 in. and under	22.75 to 23.25
Cast iron borings	14.00 to 14.50
Short shov. turn.	14.50 to 15.00
Machine shop turn.	14.50 to 15.00
Rerolling rails	21.25 to 21.75
Steel rails under 3 ft.	23.50 to 24.00
Steel rails under 2 ft.	24.00 to 24.50
Angle bars steel	23.00 to 23.50
Cast iron carwheels	21.00 to 21.50
Railroad malleable	21.00 to 21.50
Agrie. malleable	18.50 to 19.00

Per Net Ton	
Iron car axles	\$24.50 to \$25.00
Steel car axles	24.50 to 25.00
Locomotive tires	18.75 to 19.25
Pipes and flues	14.50 to 15.00
No. 1 machinery cast	18.50 to 19.00
Clean auto blocks	18.00 to 18.50
No. 1 railroad cast	18.00 to 18.50
No. 1 agrie. cast	16.50 to 17.00
Stove plate	13.50 to 14.00
Grate bars	14.50 to 15.00
Brake shoes	14.50 to 15.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$22.00 to \$22.50
No. 2 hvy. mltng. steel	20.50 to 21.00
Low phos. plate	24.00 to 24.50
No. 1 busheling	21.00 to 21.50
Hydraulic bundles	21.50 to 22.00
Machine shop turn	14.50 to 15.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$21.00 to \$21.50
No. 2 hvy. mltng. steel	20.00 to 20.50

Comp. sheet steel	\$20.50 to \$21.00
Light bund. stampings	17.00 to 17.50
Drop forge flashings	19.50 to 20.00
Machine shop turn	13.50 to 14.00
Short shov. turn	14.00 to 14.50
No. 1 busheling	20.25 to 20.75
Steel axle turnings	20.50 to 21.00
Low phos. billet and bloom crops	25.00 to 25.50
Cast iron borings	14.50 to 15.00
Mixed bor. & turn.	14.50 to 15.00
No. 2 busheling	14.50 to 15.00
No. 1 cupola cast	22.50 to 23.00
Railroad grate bars	15.50 to 16.00
Stove plate	15.50 to 16.00
Rails under 3 ft.	25.50 to 26.00
Rails for rolling	25.00 to 25.50
Railroad malleable	24.50 to 25.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$21.50 to \$22.00
No. 2 hvy. mltng. steel	19.50 to 20.00
Scrap rails	22.50 to 23.00
New hvy. b'ndled sheets	19.50 to 20.00
Old hydraul. bundles	18.00 to 18.50
Drop forge flashings	19.50 to 20.00
No. 1 busheling	19.50 to 20.00
Machine shop turn	14.00 to 14.50
Shov. turnings	15.00 to 15.50
Mixed bor. & turn.	14.00 to 14.50
Cast iron borings	14.00 to 14.50
Knuckles & couplers	25.00 to 25.50
Coil & leaf springs	25.00 to 25.50
Rolled steel wheels	25.00 to 25.50
No. 1 machinery cast	20.50 to 21.00
No. 1 cupola cast	19.00 to 20.00
Stove plate	17.00 to 17.50
Steel rails under 3 ft.	25.50 to 26.00
Cast iron carwheels	18.50 to 19.50
Railroad malleable	24.00 to 24.50
Low phos. plate	26.00 to 27.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	\$17.75 to \$18.25
No. 1 hvy. melting	17.50 to 18.00
No. 2 hvy. melting	16.75 to 17.25
No. 1 locomotive tires	21.00 to 21.50
Misc. stand. sec. rails	21.25 to 21.75
Railroad springs	23.25 to 23.75
Bundled sheets	14.00 to 14.50
Cast bor. & turn.	10.00 to 10.50
Machine shop turn.	11.00 to 11.50
Heavy turnings	13.50 to 14.00
Rails for rolling	23.50 to 24.50
Steel car axles	24.75 to 25.25
No. 1 RR. wrought	15.00 to 15.50
No. 2 RR. wrought	16.50 to 17.00
Steel rails under 3 ft.	23.75 to 24.25
Steel angle bars	22.00 to 22.50
Cast iron carwheels	21.00 to 21.50
No. 1 machinery cast	20.50 to 21.00
Railroad malleable	21.00 to 21.50
Breakable cast	18.00 to 18.50
Stove plate	15.00 to 15.50
Grate bars	13.50 to 14.00
Brake shoes	15.00 to 15.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	\$18.00 to \$18.50
No. 2 hvy. mltng. steel	16.50 to 17.00
Scrap rails for mltng.	23.25 to 23.75
Loose sheet clippings	12.50 to 13.00
Hyd'lic bundled sheets	16.50 to 17.00
Cast iron borings	9.25 to 9.75
Machine shop turn	10.00 to 10.50
No. 1 busheling	14.00 to 14.50
No. 2 busheling	7.50 to 8.00
Rails for rolling	24.25 to 24.75
No. 1 locomotive tires	20.00 to 20.50
Short rails	25.25 to 25.75
Cast iron carwheels	18.75 to 19.25
No. 1 machinery cast	21.75 to 22.25
No. 1 railroad cast	20.25 to 20.75
Burnt cast	13.25 to 13.75
Stove plate	13.25 to 13.75
Agrie. malleable	18.25 to 18.75
Railroad malleable	21.25 to 21.75
Mixed hvy. cast	18.50 to 19.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	\$19.00
No. 2 hvy. melting steel	18.00
No. 1 busheling	17.00
Scrap steel rails	19.00
Steel rails under 3 ft.	21.00
Rails for rolling	20.00
Long turnings	9.50
Cast iron borings	8.50
Stove plate	12.50
Steel axles	19.00
No. 1 RR. wrought	17.00
No. 1 cast	18.50
No. 2 cast	14.00
Cast iron carwheels	20.00
Steel carwheels	19.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting	\$16.50 to \$17.00
No. 2 heavy melting	15.50 to 16.00
Borings and turnings	12.00 to 12.50
Machine shop turnings	12.00 to 12.50
Long turnings	9.50 to 10.00
Short shov. turnings	12.50 to 13.00
No. 1 cast	18.50 to 19.00
Automotive cast	19.00 to 19.50
Hvy. breakable cast	15.00 to 15.50
Stove plate	12.00 to 12.50
Hydraul. comp. sheets	18.50 to 19.00
New busheling	17.00 to 17.50
Sheet clips	14.00 to 14.50
Flashings	16.50 to 17.00
Low phos. plate	19.50 to 20.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	\$16.00 to \$16.50
No. 2 hvy. mltng. steel	15.00 to 15.50
Hvy. breakable cast	17.00 to 17.50
No. 1 machinery cast	18.50 to 19.00
No. 2 cast	15.50 to 16.00
Stove plate	13.50 to 14.00
Steel car axles	21.00 to 21.50
Shafting	20.00 to 20.50
No. 1 RR. wrought	16.50 to 17.00
No. 1 wrought long	15.50 to 16.00
Spec. iron & steel pipe	13.00 to 13.50
Rails for rolling	20.00 to 20.50
Clean steel turnings*	10.00 to 10.50
Cast borings*	10.50 to 11.00
No. 1 blast furnace	9.00 to 9.50
Cast borings (chem.)	11.50 to 12.00
Unprepared yard scrap	9.50 to 10.00
Light iron	6.50 to 7.00

Per gross ton delivered local foundries:

No. 1 machin. cast	\$19.00 to \$19.50
No. 2 cast	16.50 to 17.00

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

Breakable cast	\$15.75 to \$16.00
Machine shop turn	9.25 to 9.50
Mixed bor. & turn.	8.75 to 9.25
Bun. skeleton long	12.50 to 12.75
Shafting	19.65 to 19.75
Stove plate	12.75 to 13.00
Cast bor. chemical	9.75 to 10.00

Per gross ton delivered consumers' yards:

Textile cast	\$20.00 to \$21.00
No. 1 machine cast	20.00 to 20.75

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel	\$15.75 to \$16.00
No. 2 steel	14.75 to 15.50

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	\$14.25	\$13.25	\$15.00
No. 2 hvy. mltng. steel		12.00	
Bundles		10.00	

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	\$13.00	\$12.50
No. 1 hvy. mltng. steel	11.25	10.75
No. 2 hvy. mltng. steel	10.00	9.75
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.50	7.00
Cast borings	7.50	7.00
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	15.75	15.25

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered barges	
No. 1 hvy. mltng. steel	\$16.00
No. 2 hvy. mltng. steel	15.00
No. 2 cast	\$15.00 to 15.50
Stove plate	14.50 to 15.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	\$16.00
No. 2 hvy. mltng. steel	\$15.00 to 15.50
Rail (scrap)	16.00 to 16.25

Philadelphia, delivered alongside boats, Port Richmond

No. 1 hvy. mltng. steel	Nominal
No. 2 hvy. mltng. steel	Nominal

Construction Steel

...STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Awards drop to 14,625 tons from 25,700 tons last week; new projects lower at 13,225 tons against 36,225 tons a week ago; plate lettings call for 1655 tons.

AWARDS NORTH ATLANTIC STATES

- 1050 Tons, Messina, N. Y., building No. 140 for Aluminum Co. of America, to Bethlehem Steel Co., Philadelphia, Pa.
700 Tons, Duane, N. Y., State bridge PSC-4775, to American Bridge Co., Pittsburgh.
600 Tons, Niagara Falls, N. Y., plant addition for Union Carbide Co., to Lackawanna Steel Construction Co., Buffalo.
400 Tons, Philadelphia, research laboratory for Frankford Arsenal, to Lehigh Structural Steel Co., Allentown, Pa.
300 Tons, Pittsfield, Mass., General Electric Co. mill building No. 14, to Lehigh Structural Steel Co., Allentown, Pa.
250 Tons, Greenville, Pa., Thiel College, girls' dormitory, to Guibert Steel Co., Pittsburgh.
190 Tons, Snyder County, Pa., State highway bridge, to American Bridge Co., Pittsburgh.
105 Tons, Troy, N. Y., Coca-Cola Building, to West Side Structural Co., Troy.
100 Tons, North Tonawanda, N. Y., building addition for National Grinding Wheel Co., to Ernst Iron Works and Reecon Co., both of Buffalo.

THE SOUTH

- 1150 Tons, Jefferson Island, La., rebuilding salt-mining, storage and distributing plant of Jefferson Island Salt Co., to Ingalls Iron Works Co., Birmingham.
380 Tons, South Charleston, W. Va., resin storage building for Carbide & Carbon Chemical Corp., to Bethlehem Steel Co., Bethlehem, Pa.
293 Tons, Radford, Va., combined shop buildings for Hercules Powder Co., to Ingalls Iron Works Co., Pittsburgh plant, through Mason & Hanger Construction Co.
106 Tons, Mobile, Ala., repair shop for Army Corps, to Ingalls Iron Works Co., Birmingham.

CENTRAL STATES

- 5250 Tons, Jefferson Barracks, Mo., Mississippi River bridge; 4100 tons to Bethlehem Steel Co., Bethlehem, Pa., and 1150 tons to Stupp Brothers Bridge & Iron Co., St. Louis, through Massman Construction Co.
1500 Tons, Cicero, Ill., building for Danly Machine Specialties Co., to Wendnagel & Co., Chicago.
1000 Tons, Canton, Ohio, electric furnace building extension for Republic Steel Corp., to Fort Pitt Bridge Works Co., Cleveland.
470 Tons, Cleveland, warehouse for Sears-Roebuck & Co., to Bethlehem Steel Co., Bethlehem, Pa.

- 220 Tons, Cleveland, building for Westinghouse Electric & Mfg. Co., to Ingalls Iron Works Co., Birmingham, through H. K. Ferguson Co., Cleveland.

WESTERN STATES

- 200 Tons, Reno, Nev., engineering building, University of Nevada, to Alling Iron Works, Sacramento, Cal., through M. R. Peterson, Sacramento, Cal., contractor.
140 Tons, Modesto, Cal., Pacific Can Co. plant, to Independent Iron Works, Oakland, Cal.

HAWAII

- 200 Tons, two cranes for Pearl Harbor Navy Yard, to Fort Pitt Bridge Works Co., Cleveland, through R. W. Kaltenbach Corp.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 800 Tons, New London, Conn., submarine railway cradle for Government.
680 Tons, Camden County, N. J., grade crossing elimination; bids Dec. 20.
600 Tons, Allegheny County, Pa., highway bridge; bids Dec. 13.
400 Tons, Dauphin County, Pa., highway bridge; bids Dec. 13.
350 Tons, Livingston County, N. Y., State highway bridge; bids Dec. 18.
300 Tons, Portsmouth, N. H., State bridge.
255 Tons, Westchester County, N. Y., highway bridge.
200 Tons, Batavia, N. Y., factory addition for Doehler Die Casting Co.
175 Tons, New York, penthouses and conveyor bridge for Consolidated Edison Co., hawk Paving Co., Buffalo, low bidder.
150 Tons, Corfu, N. Y., highway bridge; Mo-
110 Tons, Adams County, Pa., highway bridge; bids Dec. 13.
100 Tons, Hamburg Township, N. Y., West Seneca grade school No. 5.

CENTRAL STATES

- 2800 Tons, Winona, Minn., State bridge No. 5900 over Main Channel.
900 Tons, Newberry, Ind., State bridge, contract No. 2071.
800 Tons, Bluff Siding, Wis., State North Channel bridge, Mississippi River crossing.
400 Tons, Crawfordsville, Ind., buildings for R. R. Donnelley & Sons.
350 Tons, Newberry, Ind., State bridge contract No. 2072.
250 Tons, Banner City, Ind., State bridge contract No. 2074.
225 Tons, Speed, Ind., State bridge, contract No. 2075.
210 Tons, Savanna, Ill., Apple River highway bridge for Government.
200 Tons, Mount Vernon, Ohio, Lamb Glass Co. building; Case, Crane & Kilbourne Jacobs Co., Columbus, low bidder on general contract.
180 Tons, Youngstown, Ohio, hangar for airport; Sause Engineering Co., low bidder.
130 Tons, Minneapolis, machine and shop building for Electric Machinery Mfg. Co.

- 110 Tons, Lincoln, Ill., State bridge, route FA-5, section 22-X1-VF-1.

WESTERN STATES

- 2700 Tons, Ogden, Utah, Air Corps airplane repair shop, Hill Field.

FABRICATED PLATES

AWARDS

- 1300 Tons, Vancouver, Wash., Aluminum Co. of America plant, to Puget Sound Machinery Depot, Seattle.
205 Tons, Jacksonville, Fla., 16 horizontal tanks for Aqua Systems, Inc., to Buffalo Tank Corp., Buffalo.
150 Tons, Auburn, N. Y., welded bases for American Locomotive Co., to Bethlehem Steel Co., Bethlehem, Pa.

PENDING PROJECTS

- 800 Tons, Moon Lake, Utah, Duchesne power plant.

SHEET PILING

PENDING PROJECTS

- 102 Tons, San Francisco, Navy Schedule 2650; bids Dec. 5.

Reinforcing Steel

Awards of 5600 tons; 8710 tons in new projects

AWARDS

ATLANTIC STATES

- 275 Tons, Philadelphia, building for Navy Yard, to Taylor-Davis, Inc., Philadelphia, through A. E. Baton, general contractor.
200 Tons, Jamaica, N. Y., Fairchild Aviation Corp., Aerial Camera Mfg. plant, to Jones & Laughlin Steel Corp., Pittsburgh, through Fireproof Products Co.; White Construction Co., contractor.
200 Tons, Meriden-Berlin, Conn., mesh, section of route No. 5, to Truscon Steel Co., Boston, through Arute Brothers, New Britain, Conn., contractors.
120 Tons, Pittsburgh, Terrace Village recreation buildings, to Jones & Laughlin Steel Corp., Pittsburgh, through Dambach & Co., Navarro Corp.
100 Tons, Hartford-Winsted, Conn., State road, to Truscon Steel Co., Boston, through Alexander Jarvis Co., Manchester, Conn., contractor.
100 Tons, Albany County, N. Y., mesh for project FARC 40-88, to Truscon Steel Co., Youngstown, through A. Berlanti.

SOUTH AND CENTRAL

- 2000 Tons, Dearborn, Mich., superstructure, Ford Motor Co., aircraft engine plant, Ford company to roll and furnish to contractor.
651 Tons, San Antonio, Tex., Apache Courts housing project, to Truscon Steel Co., Youngstown, through Walsh & Burney Co.

Weekly Bookings of Construction Steel

Week Ended →	Dec. 3, 1940	Nov. 26, 1940	Nov. 4, 1940	Dec. 5, 1939	Year to Date	
					1940	1939
Fabricated structural steel awards	14,625	25,700	32,300	15,080	1,074,460	882,575
Fabricated plate awards	1,655	4,875	1,780	0	142,130	142,390
Steel sheet piling awards	0	200	170	0	65,380	75,365
Reinforcing bar awards	5,600	12,850	5,000	3,720	442,495	429,940
Total Letting of Construction Steel	21,880	43,625	39,255	18,800	1,724,465	1,530,270

536 Tons, Norfolk, Va., supply pier and rehabilitation submarine base, to Truscon Steel Co., Youngstown, through McLean Construction Co.

300 Tons, Little Rock, Ark., housing project, to Jones & Laughlin Steel Corp., Pittsburgh, through Arkansas Foundry Co.

200 Tons, Macomb County, Mich., Chrysler Corp. buildings, to Truscon Steel Co., Youngstown, through O. W. Burke Co., Detroit.

125 Tons, Rock Island, Ill., housing project, to Bethlehem Steel Co., Bethlehem, Pa., through Lovering Construction Co.

100 Tons, Wilmington, Ill., ammunition loading plant, to Truscon Steel Co., through Sanderson & Porter, contractors.

100 Tons, Detroit, Packard Motor Co., buildings, to Truscon Steel Co., Youngstown, through O. W. Burke Co., Detroit.

WESTERN STATES

136 Tons, Helena, Mont., Treasury Department requirements, to Truscon Steel Co., Youngstown.

110 Tons, Reno, Nev., engineering building, University of Nevada, to Bethlehem Steel Co., San Francisco, through M. R. Peterson, Sacramento, Cal., contractor.

CANAL ZONE

325 Tons, Canal Zone, buildings CQM-6708-41-9 to Truscon Steel Co., Youngstown, through McDonald Construction Co., Tacoma, Wash.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

2000 Tons, Camden, N. J., New York Shipbuilding Corp. shipways; Merritt-Chapman & Scott, contractors.

800 Tons, Brooklyn, Hamilton Avenue bridge; bids Dec. 10.

800 Tons, Cambridge, Mass., housing project.

550 Tons, Annapolis, Md., dormitory addition, Irwin & Leighton, general contractors.

195 Tons, Westchester County, N. Y., highway bridge.

125 Tons, Livingston County, N. Y., highway bridge.

125 Tons, Camden County, N. J., grade crossing elimination; bids Dec. 20.

SOUTH AND CENTRAL

3000 Tons, Arlington, Va., Government office building.

400 Tons, Cincinnati, Streitman Biscuit Co. bakery; bids taken.

WESTERN STATES

380 Tons, Oakland, Cal., Navy transit shed, garage, firehouse and public works shops (Specification 10,111); K. E. Parker, San Francisco, contractor.

122 Tons, Banning, Cal., storm drain; bids taken.

113 Tons, Phoenix, Ariz., highway work on Phoenix-Preston highway; bids Dec. 10.

100 Tons, Burlingame, Cal., post office; bids Dec. 11.

Cast Iron Pipe

Board of Black Hawk County Supervisors, Court House, Waterloo, Iowa, plans about 4000 ft. of 8-in. pipe for water supply from Walker and Longfellow Streets to county isolation hospital. Raymond Stevenson is county engineer.

Water Department, Cincinnati, plans extensions in water pipe lines from California to Mount Washington Street, including new pumping station. Cost close to \$225,000.

Kirkwood, Mo., plans pipe line extension in water system from supply tanks on Rose Hill Avenue to point on Marshall Road. Cost about \$35,000. Special election is being arranged on or about Dec. 16 to vote bonds for work. J. P. Sparks, 137 South Kirkwood Road, is engineer.

Hagerstown, Md., plans extensions in pipe lines for water supply on Middleburg Pike, about four miles. Financing will be carried out through Federal aid.

Rocky Mount, N. C., has approved bond issue of \$250,000 for extensions and improvements in water pipe lines and other waterworks installation.

Water Department, City Hall, Erie, Pa., plans extensions and improvements in water system in different parts of city, including other waterworks installation; also for extensions in main supply line to Erie housing project site. Cost close to \$200,000. A. N. Aitkin is city engineer.

Republic, Ohio, plans pipe lines for water system and other waterworks installation, including elevated steel tank and tower; bids to be asked soon. Champe, Finkbeiner &

Associates, Nicholas Building, Toledo, Ohio, are consulting engineers.

Columbia, Tenn., plans extensions and replacements in water pipe lines and other waterworks installation. Survey is being made by Morris Knowles, Inc., Westinghouse Building, Pittsburgh, consulting engineer.

Little River, Kan., plans about 18,600 ft. of 6-in. pipe for water system; also two deep-well turbine pumping units and other waterworks installation. Cost about \$53,000. Special election has been called Dec. 19 to vote bonds for \$24,000, remainder of cost to be secured through Federal aid. Paulette & Wilson, Public Utilities Building, Salina, Kan., are consulting engineers.

United States Treasury Department, Los Angeles, has awarded 257 tons of 10 and 12-in. pipe for Ventura and Lynwood, Cal., to United States Pipe & Foundry Co., San Francisco (Schedules 73660 and 73763).

Sacramento, Cal., will take bids Dec. 6 on 2000 ft. of 8-in. and 10,000 ft. of 6-in. pipe.

Pipe Lines

Stanolind Pipe Line Co., Philcade Building, Tulsa, Okla., affiliated with Stanolind Oil & Gas Co., same address, plans replacements and improvements in section of main welded steel pipe line system from Mexia, Tex., to Graford, Tex., used for crude oil transmission, using 8 and 10-in. cast iron, welded joint, pressure pipe. Cost over \$300,000.

City Council, Dumas, Tex., has engaged Freese & Nichols, Capps Building, Fort Worth, Tex., consulting engineers, to prepare plans for proposed pressure pipe line system for natural gas distribution, including main welded steel pipe line for connection with supply source, control station and other facilities. A bond issue of \$60,000 is available.

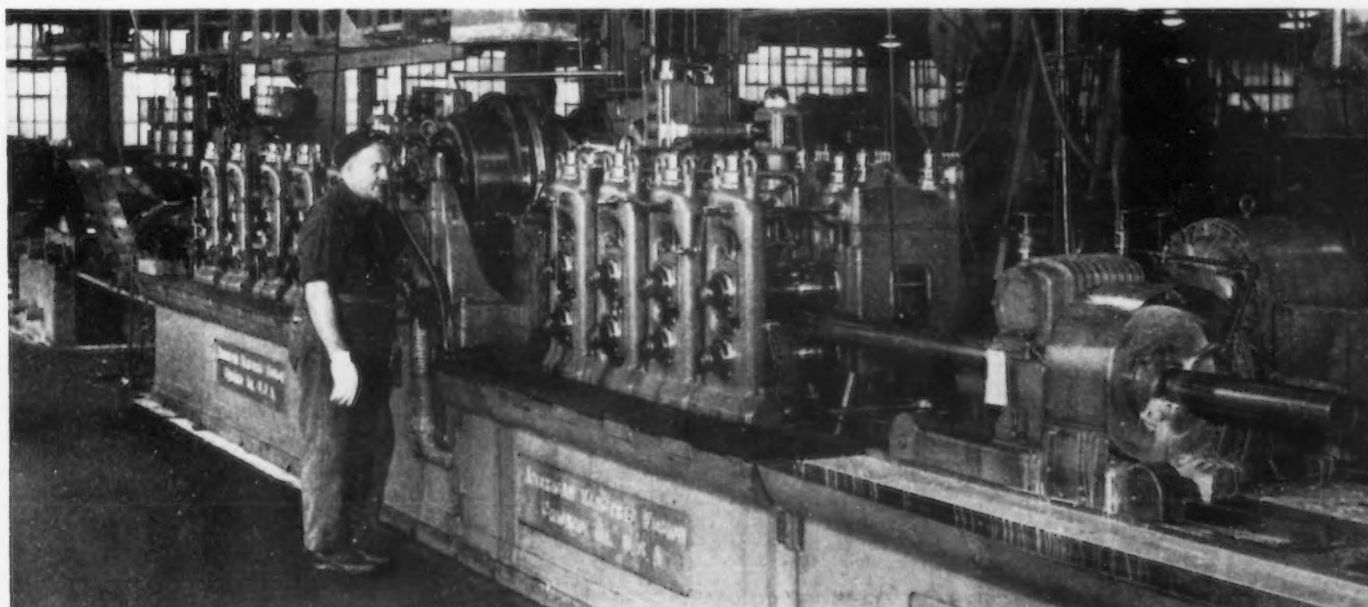
Public Works Officer, Naval Air Station, Corpus Christi, Tex., has plans by Robert & Co., Inc., Bona Allen Building, Atlanta, Ga., consulting engineer, for pressure pipe line system at local field for natural gas distribution, including control station and other facilities. Cost about \$150,000.

Constructing Quartermaster, Military Academy, West Point, N. Y., asks bids until Dec. 17 for pressure pipe lines for gasoline fueling system at Stewart Field, near West Point.

Shell Union Oil Corp., 50 West Fiftieth Street, New York, has let contract to Lane Construction Co., 37 Colony Street, Meriden, Conn., for pressure pipe lines, including underground lines, from Fall River to Waltham, Mass., about 85 miles, including branch pipe line to Sherborn, Mass., for gasoline transmission.

Bureau of Reclamation, Denver, closes bids Jan. 2 for four 15-ft. diameter welded steel pipes, for main-unit penstocks at Shasta dam, Central Valley project, Cal., including pipe line branches to station-service units, and all supports and appurtenances (Specification 941).

THIS 4-IN. A. E. F. continuous tube mill was recently installed at the Buick plant for making torque tubes from flat steel strip. The mill forms, welds, scarfs, sizes, straightens and cuts to length the tubing in one pass at a speed of approximately 40 ft. per min. Strip uncoiling reel, which is synchronized with the speed of the mill, is seen at the left. Seven passes through rollers form the tube ready for the welding operation, performed with the roller seen in the middle of the photo. The slight burr resulting from the weld is next removed by a stationary scarfing tool. Tubing then passes through four stages of sizing and straightening rolls, bringing it to 3 1/2 in. o.d. and 5/32 in. wall, after which a rotating chuck type cut-off, mounted on a carriage, cuts tubing to required length.



Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product													DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes ²	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢		(Worcester = 3.00¢)				2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢		(Worcester = 3.35¢)				3.05¢		
TIN PLATE															
Standard cokes (Per 100-lb base box)	\$5.00	\$5.00	\$5.00						\$5.10						
BLACK PLATE															
29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (19)			
TERNES, M'FG.															
Special coated (Per base box)	\$4.30		\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth = 2.25¢)		2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail) ⁷	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES										(Coatesville and Claymont = 2.10¢)					
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢					(Coatesville = 3.50¢)								
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem = 2.10¢)		2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester = 3.00¢)						
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester = 4.50¢)						
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester = 6.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester = 8.55¢)						
WIRE⁹															
Bright	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)						
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)						
Spring	3.20¢	3.20¢		3.20¢					(Worcester = 3.30¢)						
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS															
Common		2.25¢				(Terre Haute, Ind. = 2.15¢)									
Refined	3.75¢														
Wrought	4.40¢														

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to 29 gage within certain width and length limitations. ⁶ For merchant trade. ⁷ Straight lengths as quoted by distributors. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lots to manufacturing trade. ¹⁰ Boxed.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher f.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Rerolling\$34.00
Forging quality 40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

Per Gross Ton
3 in. to 12 in.....\$52.00
12 in. to 18 in..... 54.00
18 in. and over..... 56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open hearth or bessemer.....\$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared. 1.90c.

Wire Rods

(No. 5 to 9/32 in.) *Per Lb.*
Pittsburgh, Chicago, Cleveland. 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.50c.
Galveston 2.25c.
9/32 in. to 4/64 in., \$3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)
20x14 in. 20x28 in.

8-lb. coating I.C....	\$6.00	\$12.00
15-lb. coating I.C....	7.00	14.00
20-lb. coating I.C....	7.50	15.00
25-lb. coating I.C....	8.00	16.00
30-lb. coating I.C....	8.63	17.25
40-lb. coating I.C....	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

Base per Keg
Standard wire nails\$2.55
Coated nails 2.55
Cut nails, carloads 3.85

Base per 100 Lb.
Annealed fence wire\$3.05

Base Column
Woven wire fence*..... 67
Fence posts (carloads)..... 69
Single loop bale ties..... 56
Galvanized barbed wire†..... 70
Twisted barbless wire 70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:

½ in. and smaller by 6 in. and shorter68
9/16 and ¾ in. by 6 in. and shorter66
¾ to 1 in. by 6 in. and shorter.64
1½ in. and larger, all lengths..62
All diameters over 6 in. long..62
Lag, all sizes.....65

Plow bolts68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:
½ in. and smaller.....66
9/16 to 1 in. inclusive.....63
1½ in. to 1½ inclusive.....61
1½ in. and larger.....60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller....	66	70
9/16 to 1 in.....	63	65
1½ in. through 1½ in..	61	62
1½ in. and larger....	60	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose

72½ and 10

Stove bolts in packages, with nuts

attached72½

Stove bolts in bulk.....82

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham\$3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham65 and 10

Cap and Set Screws

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller...50 and 10

Milled headless set screws, cut thread ¼ in. and larger..... 64

3/16 in. and smaller..... 73

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller 70

Upset set screws, cup and oval points 75

Milled studs 52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Nov. 27	Nov. 28	Nov. 29	Nov. 30	Dec. 2	Dec. 3
Copper, Electrolytic¹	12.00	12.00	12.00	12.00	12.00	12.00
Copper Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York	50.30	50.30	50.30	..	50.20	50.20
Zinc, East St. Louis²	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis³	5.65	5.50	5.50	5.50	5.35	5.35

¹ Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	51.50	53.75
Copper		
Electro	12.75	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	8.50	Nom'al
Sheets, No. 9 casks..	12.50	Nom'al
Lead		
American pig	6.50	6.00
Bar	8.45	8.50
Cut sheets	8.80	8.75
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	30.875	32.00
Babbitt		
Anti-friction grade ..	23.50	21.50

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	10.00	10.625
Hvy. and wire	9.00	9.40
Light and bottoms..	8.00	8.50
Brass		
Heavy	5.750	6.255
Light	4.750	5.50
No. 1 yel. turn.	5.50	6.50
No. 1 red or compo. turnings	8.75	9.25
Hvy. Mach. compo..	9.125	9.50
Lead		
Heavy	4.75	5.25
Aluminum		
Cast	10.00	11.00
Sheet	13.00	14.00
Zinc	5.00	5.25

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cents plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 15-15.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$168-\$170 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33%; on brass sheets and rods, 40; on brass tubes, 33½, and copper tubes, 40.

PRICES

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....\$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade 2.70c.
Delivered, Detroit 2.80c.

S.A.E. Alloy Differential,
Series per 100 Lb.
Numbers
2000 (1.5 Ni)\$0.35

2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.) ..	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.) ..	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)...	2.60
6100 Cr-V bar	1.20

6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c., carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.
Open hearth grade 3.50c.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes ..	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars ...	18.50c.	19.00c.	22.50c.	27.50c.
Plates ..	21.50c.	22.00c.	25.50c.	30.50c.
Sheets ..	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip ..	17.00c.	17.50c.	24.00c.	35.00c.
C'd st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago..	\$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham..	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago.

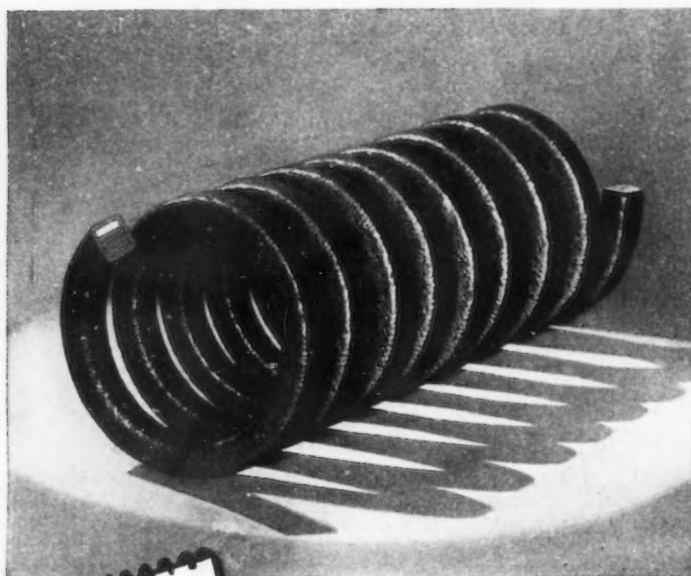


Illustration shows GARLOCK 150 spiral. If coil form is desired—specify GARLOCK 125. If cut rings are desired—specify GARLOCK 200.



*for Superior Packing
Performance against
Steam*

WHY do so many thousands of engineers "prescribe" GARLOCK 150 High Pressure Packing—consistently year after year? Because they know from experience that GARLOCK 150 is tough, strong, dependable. They know it prevents costly shut-downs for frequent repacking. They know it saves money. For superior performance on piston rods of engines, pumps, compressors, expansion joints, etc., against steam pressures up to 300 lbs., standardize on GARLOCK 150.



THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

In Canada: The Garlock Packing Company
of Canada Ltd., Montreal, Que.

GARLOCK 150

PRICES

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless	Lap Weld,
	Cold Drawn	Hot Rolled
1 in. o.d. 13 B.W.G.	\$9.01	\$7.82
1 1/4 in. o.d. 13 B.W.G.	10.67	9.26
1 1/2 in. o.d. 13 B.W.G.	11.70	10.23
1 3/4 in. o.d. 13 B.W.G.	13.42	11.64
2 in. o.d. 13 B.W.G.	15.03	13.04
2 1/4 in. o.d. 13 B.W.G.	16.76	14.54
2 1/2 in. o.d. 12 B.W.G.	18.45	16.01
2 3/4 in. o.d. 12 B.W.G.	20.21	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50
3 1/2 in. o.d. 11 B.W.G.	28.37	24.62
4 in. o.d. 10 B.W.G.	35.20	30.54
4 1/2 in. o.d. 10 B.W.G.	43.04	37.35
5 in. o.d. 9 B.W.G.	54.01	46.87
6 in. o.d. 7 B.W.G.	82.93	71.96

Extras for less carload quantities:

40,000 lb. or ft. over.....	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.....	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price=\$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
1/8 in.	56	36
1/4 to 3/8 in.	59	43 1/2
1/2 in.	63 1/2	54
3/4 in.	66 1/2	58
1 to 3 in.	68 1/2	60 1/2

Wrought Iron

	Black	Galv.
1/4 and 3/8 in.	+9	+10
1/2 in.	24	6 1/2
3/4 in.	30	13
1 and 1 1/4 in.	34	19
1 1/2 in.	38	21 1/2
2 in.	37 1/2	21

Lap Weld

Steel		
2 in.	61	52 1/2
2 1/2 and 3 in.	64	55 1/2
3 1/2 to 6 in.	66	57 1/4
7 and 8 in.	65	55 1/2
9 and 10 in.	64 1/2	55
11 and 12 in.	63 1/2	54

Wrought Iron

2 in.	30 1/2	15
2 1/2 to 3 1/2 in.	31 1/2	17 1/2
4 in.	33 1/2	21
4 1/2 to 8 in.	32 1/2	20
9 to 12 in.	28 1/2	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
1/8 in.	54 1/2	41 1/2
1/4 to 3/8 in.	56 1/2	45 1/2
1/2 in.	61 1/2	53 1/2
3/4 in.	65 1/2	57 1/2
1 to 3 in.	67	60

Wrought Iron

1/4 and 3/8 in.	+10	+43
1/2 in.	25	9
3/4 in.	31	15
1 to 2 in.	38	22 1/2

Lap weld, extra strong, plain ends

Steel		
2 in.	59	51 1/2
2 1/2 and 3 in.	63	55 1/2
3 1/2 to 6 in.	66 1/2	59

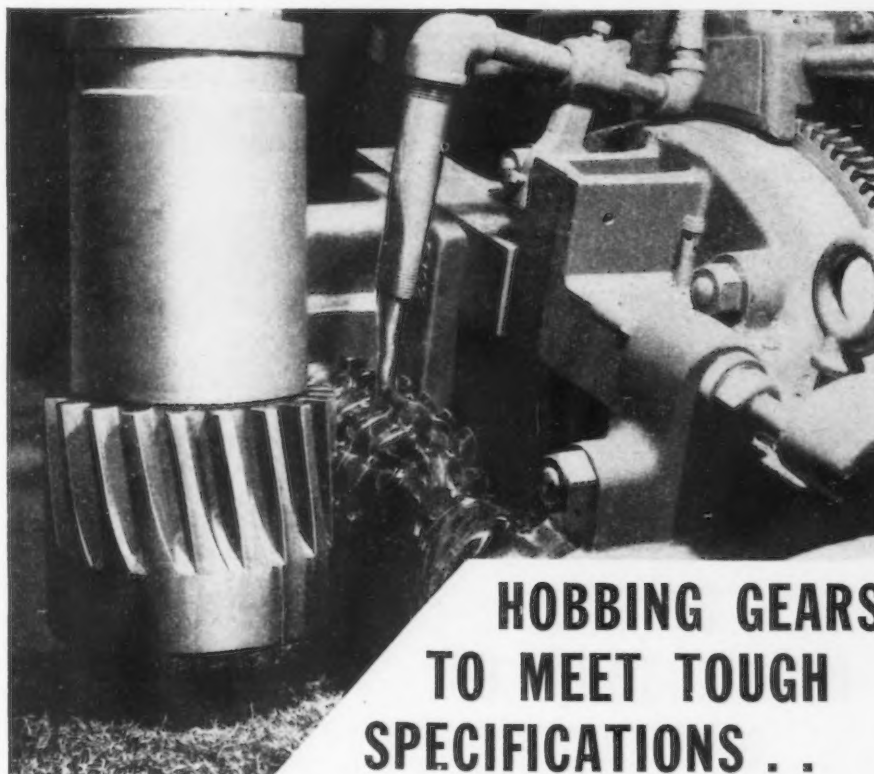
	Black	Galv.
7 and 8 in.	65 1/2	56
9 and 10 in.	64 1/2	55
11 and 12 in.	63 1/2	54

Wrought Iron

2 in.	33 1/2	18 1/2
2 1/2 to 4 in.	39	25 1/2
4 1/2 to 6 in.	37 1/2	24
7 and 8 in.	38 1/2	24 1/2
9 to 12 in.	32	20 1/2

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.



HOBGING GEARS TO MEET TOUGH SPECIFICATIONS..

HOBGING gears of extreme hardness (325—350 Brinell) as used in oil well pumping reducers—for particularly arduous duty—was the problem of a Chicago manufacturer. In cutting and maintaining this unusual hardness and maintaining high accuracy, Cities Service oils were used as the cutting lubricant.

No doubt you have one or two like problems in your shop. Why not find

out what our lubrication engineers can do for you in your own shop with the right metal cutting lubricant? Just write us to have a lubrication engineer call.

Copies of our booklet on "Metal Cutting Lubrication" are available to users of metal cutting lubricants. Write for your copy today, before the supply is exhausted.



Cutting Oils
"SERVICE PROVED"

CITIES SERVICE OIL COMPANY,
Sixty Wall Tower, Room 1626F, New York

Please send me information concerning your Lubrication Engineers' Service ☐
Please send me booklet on Metal Cutting Lubrication ☐

Name.....Title.....

Business Address.....

Firm Name.....

City.....State.....

PRICES

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bessemer, 51.50%..	\$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%.....	4.60
Mesaba, non-bessemer, 51.50%	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive or Duty

Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe	Nom.
---	------

Caucasian, washed, 52% Mn....	Nom.
African, Indian, 44 to 48% Mn....	50c.
African, Indian, 49 to 51% Mn....	54c.
Brazilian, 46 to 48% Mn.....	50c.
Cuban, del'd, duty free, 51% Mn..	68c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	\$23 to \$24
Tungsten, domestic scheelite, delivered	\$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	Nom.
Rhodesian, 45%	\$23.50
Rhodesian, 48%	27.50

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	\$40.00
Angle bars, 100 lb.....	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	\$40.00
Light rails (from rail steel), gross ton	39.00

Base per Lb.

Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)...	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail....	\$20.00 to \$21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines..	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works

Super-duty brick at St. Louis..	\$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey....	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton.....	7.10

Silica Brick

Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester...	\$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester	\$72.00
Chemically Bonded, f.o.b. Baltimore	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	\$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.



Therm-O-flake INSULATION BRICK

One of lightest insulation brick available—(about one pound each).

Has low thermal conductivity, and is most economical for efficient insulation.

Can be compacted without breaking and cuts easily. Especially valuable for back up work behind fire brick walls.

Acts as expansion cushion between furnace walls and binding structure.

Write for Information and Prices

Other **Therm-O-flake** Products

Made from Exfoliated Vermiculite

Granules - Brick - Block - Concrete



JOLIET, ILL.

PRICES

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....\$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....\$36.00

Domestic, 26 to 28%.....49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk).....\$74.50*

50% (ton lots, packed).....87.00*

75% (carload lots, bulk).....135.00*

75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....\$33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....\$27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.

2% carbon17.50c.

1% carbon18.50c.

0.10% carbon20.50c.

0.06% carbon21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon\$113.00*

2.50% carbon118.00*

2% carbon123.00*

1% carbon133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... \$2.00

Ferrotungsten, 100 lb. and less 2.25

Ferrovandium, contract, per lb. contained V, del'd \$2.70 to \$2.90†

Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots \$2.25†

Ferrocolumbium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton.....\$142.50

*Spot prices are \$5 per ton higher.

†Spot prices are 10c. per lb. of contained element higher.

Ferrocobaltititanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton.....\$157.50

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24%, per gross tons, \$3 unitage, freight equalized with Nashville 75.00

Ferromolybdenum, per lb. Mo, f.o.b. furnace 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J. 4.50c.
No. 6, f.o.b. Bayonne, N. J. 2.98c.
No. 5 Bur. Stds., del'd Chicago. 3.25c.
No. 6 Bur. Stds., del'd Chicago. 2.75c.
No. 3 distillate, del'd Cleveland. 5.25c.
No. 4 industrial, del'd Cleveland. 5.00c.
No. 5 industrial, del'd Cleveland. 4.25c.
No. 6 industrial, del'd Cleveland. 3.63c.

LIGHTER GAUGE STAMPINGS, too



The versatility of our men and machines is limited only by the needs of those who entrust to us the important task of producing their stampings.

In the instance illustrated, a Tank Rim for an electrical transformer—16¾" long, 18⅛" wide and 5¼" deep—was stamped out of steel .075" thick. Yet each angle, arc, port and flange is clean and clear—and true to gauge.

Present your problems to Parish. The services of our engineers frequently result in economies of important proportions . . . yet their contributions are not evident in our costs.

Let us review your requirements.

PARISH PRESSED STEEL CO.

READING, PA.

PACIFIC COAST REPRESENTATIVE, F. Somers Peterson Co., 57 California St., San Francisco, Cal.

PRICES

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt	\$5.00 to \$5.25
Foundry, f.o.b. Connellsville, prompt	5.50 to 5.75
F'dry, by-product, Chicago.....	10.50
F'dry, by-product, New England	13.00
Foundry, by-product, Newark or Jersey City	\$11.30 to \$11.90
F'dry, by-product, Philadelphia.	11.13
F'dry, by-product, Cleveland...	11.55
F'dry, by-product, Cincinnati...	11.00
Foundry, Birmingham	7.50
F'dry, by-product, St. Louis	
	\$10.75 to \$11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports.....	\$14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export. £17	18s.
Tin plate, per base box. 32s. to	33s.
Steel bars, open hearth. £13	9s.
Beams, open hearth.... £12	2s. 6d.
Channels, open hearth. £12	2s. 6d.
Angles, open hearth.... £12	2s. 6d.
Black sheets, No. 24, gage	
£18 17s. 6d. max.*; £18 17s. 6d. min.**	
Galvanized sheets, No. 24	
gage £19 10s. max.*; £19 10s. min.**	

*Empire markets only.

**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	\$24.50	\$24.00	\$25.50	\$25.00	.....
Brooklyn	26.50	.....	.....	27.00	.....
Jersey City	25.53	25.03	26.53	26.03	.....
Philadelphia	24.84	24.34	25.84	25.34	.....
Bethlehem, Pa.	\$24.00	\$23.50	\$25.00	\$24.50	.....
Everett, Mass.	24.00	23.50	25.00	24.50	.....
Swedeland, Pa.	24.00	23.50	25.00	24.50	.....
Steelton, Pa. ....	.....	23.50	.....	.....	28.50
Birdsboro, Pa.	24.00	23.50	25.00	24.50	28.50
Sparrows Point, Md. .	24.00	23.50	.....	.....	.....
Erie, Pa.	23.00	22.50	24.00	23.50	.....
Neville Island, Pa. .	23.00	22.50	23.50	23.00	.....
Sharpsville, Pa. †† .	23.00	22.50	23.50	23.00	.....
Buffalo	23.00	22.00	24.00	23.50	28.50
Cincinnati	23.44	23.61	.....	24.11	.....
Canton, Ohio	24.39	23.89	24.89	24.39	.....
Mansfield, Ohio	24.94	24.44	25.44	24.94	.....
St. Louis	23.50	23.02	.....	.....	.....
Chicago	23.00	22.50	23.50	23.00	.....
Granite City, Ill.	23.00	22.50	23.50	23.00	.....
Cleveland	23.00	22.50	23.50	23.00	.....
Hamilton, Ohio	23.00	22.50	.....	23.00	.....
Toldeo	23.00	22.50	23.50	23.00	.....
Youngstown †† .	23.00	22.50	23.50	23.00	.....
Detroit	23.00	22.50	23.50	23.00	.....
St. Paul	25.63	.....	26.13	25.63	.....
Duluth	23.50	.....	24.00	23.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle .	27.50	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal † .	27.50	27.50	.....	28.00	.....
Toronto † .	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce.....\$22.50

CHARCOAL

Lake Superior fce.....\$27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

††On Oct. 25, Pittsburgh Coke & Iron Co. advanced its prices on foundry, malleable and bessemer pig iron \$1.50 a ton and on basic iron \$2 a ton at Sharpsville, Pa., and Youngstown. No change was made by this company in its Neville Island, Pa., quotations.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	\$3.15	\$3.05	\$3.15	\$3.35	\$3.38	\$3.23	\$3.05	\$3.51	\$3.45	\$3.18	\$3.30	\$3.48	\$4.30
Sheets, cold rolled .....	.....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	.....	4.12	4.35	4.43	6.50
Sheets, galvanized	4.75	4.60	4.42	4.75	4.55	4.64	4.40	4.66	4.75	4.95	4.75	4.98	5.25
Strip, hot rolled	3.40	3.40	3.30	3.75	3.76	3.48*	3.62	3.86	3.70	3.52	3.65	3.73	.....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.31	3.20	3.22	3.26	.....	3.41	3.83	3.54	.....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.47	3.80	3.68	4.00
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.62	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300 .	7.20	7.10	7.55	7.31	7.35	7.42	7.35	7.50	.....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100 .	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	.....	6.02	6.00	5.88	8.55
Bars, ed. drn. SAE 2300 .	8.15	8.15	8.15	8.56	8.59	8.45	8.40	8.63	.....	8.52	8.84	8.38	10.65
Bars, ed. drn. SAE 3100 .	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	.....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb.; galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb.; galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb.; cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, \$3.23.

PHILCO BATTERIES

give you what it takes to

SPEED-UP

Your Production!

The Only Triple-Insulated
Batteries with

10% EXTRA CAPACITY

in the same compartment space!

EVEN AS you read this, the wheels of industry are turning faster and faster! Materials have to be moved on and off the production line with ever-increasing speed . . . and your electric trucks are called upon to operate steadily . . . to carry heavier loads for longer working hours . . . day in and day out.

Philco Batteries give you what it takes to match the tempo of this stepped up production. 10% EXTRA CAPACITY in the same compartment space . . . ample capacity to do the entire day's work under peak conditions! Plus Triple Insulation, insuring dependable, trouble-free performance with lower charging and maintenance cost.

● Investigate Philco Batteries now! Specify them for either your present trucks or for new electric trucks. Check your requirements with Philco Engineers . . . they can help you. Write:

PHILCO

Battery Division

Dept. 370

Philadelphia, Pa.



Sales Possibilities

... CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **Bullard Co.**, Bridgeport, Conn., machine tools and parts, has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for three one-story additions to plant at Fairfield, Conn. Cost over \$150,000 with equipment.

Waterbury Lock & Specialty Co., Milford, Conn., plans two-story addition, about 45 x 160 ft., and improvements in present plant. Cost over \$65,000 with equipment.

Maine Central Power Co., Augusta, Me., has approved plans for new steam-electric generating station in 1941. Contract has been let for turbine-generator unit and high-pressure boilers, and awards for other equipment will be made soon. Cost over \$2,500,000 with extensions in transmission lines.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 10 for six Lench speed lathes (Schedule 4205) for Wickford, R. I., Jacksonville, Fla., and Corpus Christi, Tex.; four vertical milling machines (Schedule 4215), seven precision milling machines (Schedule 4217), all motor-driven, for above yards and Quantico, Va.; seven air turbine-driven portable pumps and spare parts (Schedule 4227) for Boston and Puget Sound yards.

Whitney-Blake Co., Dixwell Avenue, New Haven, Conn., insulated wire and cable, plans one-story addition and improvements in present plant. Cost close to \$50,000 with equipment. Westcott & Mapes, 139 Orange Street, are architects and engineers.

F. & M. Schaefer Brewing Co., 430 Kent Avenue, Brooklyn, will begin work soon on eight-story addition, 90 x 120 ft., for storage, distribution and other service. Cost over \$450,000 with equipment. Eggers & Higgins, 542 Fifth Avenue, New York, are architects; Elwyn E. Seelye & Co., Inc., 101 Park Avenue, New York, is consulting engineer.

Pelotte Corp., New York, care of Allan D. Emil, 170 Broadway, attorney, has taken out permit for new three-story plant at 15-33 Sixty-ninth Street, Elmhurst, L. I., for production of aircraft precision instruments. Cost over \$80,000 with equipment. A. A. Rothman is company architect.

Anaconda Wire & Cable Co., 25 Broadway, New York, plans one-story storage and distributing plant on site recently purchased at San Francisco. Cost over \$60,000 with equipment. San Francisco offices of company are at 111 Sutter Street.

American Brake Shoe & Foundry Co., 230 Park Avenue, New York, is erecting one-story addition to plant at 2681 Preble Avenue, Pittsburgh, to cost over \$50,000 with equipment.

Houde Engineering Corp., 537 East Delavan Avenue, Buffalo, automobile equipment, has let general contract to George A. Fuller & Co., Inc., 597 Madison Avenue, New York, for one-story addition, about 40,000 sq. ft. of floor space. Cost close to \$150,000 with equipment.

Air Preheater Corp., 60 East Forty-second Street, New York, power plant equipment, subsidiary of Superheater Co., same address, has let general contract to L. C. Whitford Co., Wellsville, N. Y., for one-story addition to plant at Wellsville, 85 x 225 ft. Cost over \$150,000 with equipment.

Kirke R. Wilson, 10 Lock Street, Buffalo, manufacturer of automobile repair equipment and tools, with plant at Arcade, N. Y., has acquired Rumsey Pump Corp., Seneca Falls, N. Y., pumping machinery and parts, and will operate as K. R. Wilson Rumsey Pump Co. Production will be continued at Seneca Falls plant, where expansion will be carried out for manufacture of products produced at Arcade works. Latter plant is being used largely for shell manufacture.

Folmer Graflex Corp., 154 Clarissa Street, Rochester, N. Y., cameras and parts, precision equipment, etc., plans one-story addition. Cost close to \$50,000 with equipment. Frank M. Quinlan, 8 Exchange Street, is architect.

Hooker Electrochemical Co., Niagara Falls, N. Y., industrial chemicals, has filed plans for three one-story additions. Cost over \$70,000 with equipment.

Seeley Tube & Box Co., 360 Thomas Street, Newark, N. J., has purchased part of former plant of Richardson & Boynton Co., Dover, N. J., totaling about 125,000 sq. ft. of floor space, and additional adjoining land, and will improve for production of shell containers for Picatinny Arsenal, near Dover. Plant will replace works of Seeley company at Fernwood, Pa., recently destroyed by fire.

General Baking Co., 420 Lexington Avenue, New York, has let general contract to Irons & Reynolds, Inc., same address, for new one-story plant, 100 x 130 ft., at Clifton, N. J. Cost over \$85,000 with mechanical-handling and other equipment. W. F. Silliman, 28 South Eighteenth Street, Philadelphia, is architect.

Walter Kidde & Co., Inc., 60 West Street, Bloomfield, N. J., fire extinguishers and kindred equipment, plans one-story addition for production of munitions for Government, for which contract is being secured. Cost close to \$1,000,000, of which about \$750,000 will be expended for equipment.

General Electric Co., Schenectady, N. Y., has let general contract to Industrial Constructors, Inc., Broad Street and Allegheny Avenue, Philadelphia, for one-story factory branch, storage and distributing plant, 100 x 200 ft., at York, Pa. Cost over \$85,000 with equipment.

Reading Sheet Metal Products Co., Inc., Canal and Chestnut Streets, Reading, Pa., has plans by Muhlenberg, Yerkes & Muhlenberg, Ganster Building, architects, for one-story addition. Cost over \$50,000 with equipment.

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Charles H. Grakelow, director, asks bids until Dec. 10 for cast iron sleeves and curves (Class 647), portable generator sets (Class 651); for period from Jan. 1 to June 30, 1941, for bolts, nuts, rivets, washers and machine screws (Class J), and hardware (Class H).

SKF Industries, Inc., Philadelphia, will proceed with erection of two-story addition, 60 x 100 ft., for which general contract recently was let to Turner Construction Co., 420 Lexington Avenue, New York. Cost over \$65,000 with equipment.

Union Electric Steel Corp., Grant Building, Pittsburgh, has let general contract to Frank Bryan, Inc., 1263 Chartiers Avenue, McKees Rocks, Pa., for one-story addition to mill at 809 Bell Avenue, about 90 x 245 ft. Cost over \$125,000 with equipment.

Healy Petroleum Corp., 15 Kennedy Street, Bradford, Pa., plans new three-story oil products plant, about 50 x 75 ft. Cost over \$70,000 with equipment.

Commanding Officer, Ordnance Department, Aberdeen Proving Ground, Aberdeen, Md., asks bids until Dec. 12 for converting four coal-fired steam boilers in main power house, building No. 345, for oil-burning operation (Circular 193).

Bethlehem Steel Co., Sparrows Point, Md., has asked bids on general contract for one-story addition to steel pipe works, for storage and distribution. Cost over \$300,000 with equipment.

Procurement Division, Veterans' Administration, Arlington Building, Washington, asks bids until Dec. 9 for one portable universal saw (Circular 234), portable bench sander (Circular 238).

General Purchasing Officer, Panama Canal, Washington, asks bids until Dec. 9 for twist

drills, stone drills, bolt dies, split dies, machine bits, auger bits, breast drills, files, chisels, bolt clippers, hacksaw blades, etc. (Schedule 4553), two automatic rectifiers, 1500 ft. of five-conductor control cable (Schedule 4563); until Dec. 10, 36 hand-power bench grinders, 72 hand-use reamers, diestocks, bridge reamers, pipe diestocks, machinist's and pipe vises, twist drills, monkey wrenches, tap and structural wrenches (Schedule 4560); until Dec. 11, 20,000 ft. of bare copper wire, one grinder (frame and motor only) (Schedule 4568).

Hunter Baltimore Pure Rye Distillery, Inc., 1900 East Fort Avenue, Baltimore, has let general contract to G. Walter Tovell, Inc., Eutaw and Monument Streets, for six-story addition to distillery at Owings Mills, Md., for storage and distribution. Cost over \$150,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 10 for seven motor-driven horizontal milling machines (Schedule 4202), one 50-kw. carburizing electric furnace (Schedule 4237), two tilting, tiering, telescopic fork-type trucks, with forward tilt unit, electric drive, with gas-electric power units (Schedule 4247) for Eastern and Western navy yards; 92 speed reducers (Schedule 4181) for Portsmouth, N. H., and Mare Island yards.

Eriasson Screw Machine Products Co., Inc., 25 Lafayette Street, Brooklyn, has plans for a manufacturing plant at Norwalk, Conn., 100 x 100 ft. Fletcher Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, Conn., is architect.

Apex Tool Co., Inc., 50 Remer Street, Bridgeport, Conn., has awarded contract to Carl Stalhammer, 329 Mapledale Place, for a new plant, 60 x 130 ft.

The South

• **Carolina Aluminum Co.**, Badin, N. C., plans expansion and improvements in mill, including equipment and facilities for bauxite ore reduction, conversion equipment for rotary division, and other machinery. Cost over \$200,000. Company is affiliated with Aluminum Co. of America, Inc., Pittsburgh.

United States Engineer Office, Federal Building, Louisville, asks bids until Dec. 17 for three pumping plants at Golconda, Ill.; until Dec. 18 for three pumping plants at Brookport, Ill.

Southern Household Products Co., Birmingham, has purchased local plant of American Bolt & Nut Co. for new plant for production of metal lawn furniture and kindred metal household products.

Crane Co., 375 East Main Street, Lexington, Ky., valves, steam specialties, etc., has asked bids on general contract for new one and two-story factory branch, storage and distributing plant on Midland Avenue. Cost close to \$50,000 with equipment. Robert W. McMeekin, Tatescreek Pike, is architect. Main offices are at Chicago.

Atlanta Stove Works, Inc., has let general contract to E. O. Smithfield, Red Rock Building, for one-story addition, 100 x 280 ft., for storage and distribution. Cost over \$65,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 10 for three gasoline engine-driven tractors (Schedule 4216) for Atlanta, Ga., New Orleans, and Dallas, Tex.; three motor-driven vertical shapers (Schedule 4214) for Jacksonville, Fla., Corpus Christi, Tex., and Quonset Point, R. I.; until Dec. 12, two brake presses (Schedule 4188) for Charleston, S. C., and Mare Island yards.



In an Emergency . . .

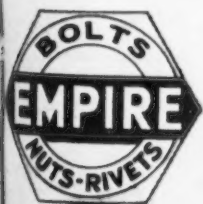
WHAT'S AT THE OTHER END OF THE LINE?



In an emergency, do you have confidence in the ability of your source of supply to take care of your needs?

Consider how important it is to know what's at the other end of the line! Is there adequate facility of plants, machinery, raw material and skilled workmen to properly fill your orders? Is quality assured, even in times when production continues through the night? Is service and customer satisfaction such an in-built habit that it can be depended upon?

These are merely a few of the points worth considering in times when industry takes a spurt. They have been a part of R B & W operations over a period of 95 years—through good times and bad, rush periods and slow. For almost a century R B & W bolts, nuts and threaded fastenings have been available always, under all business conditions—in the same outstanding quality, with the same outstanding service.



RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

PORT CHESTER, N. Y.

ROCK FALLS, ILL.

CORAOPOLIS, PA.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is arranging call for bids on general contract for one and multi-story factory branch, storage and distributing plant at Atlanta, Ga. Cost over \$500,000 with equipment. Robert & Co., Inc., Bona Allen Building, Atlanta, is architect and engineer.

Central States

● **Eaton Mfg. Co.**, 739 East 140th Street, Cleveland, automobile axles, springs, bumpers, etc., has asked bids on general contract for two one-story additions, 240 x 240 ft., and 51 x 340 ft. Cost over \$500,000 with equipment. George S. Rider Co., Terminal Tower Building, is consulting engineer.

Duriron Co., 450 North Findlay Street, Dayton, Ohio, stainless steel castings, etc., has let general contract to B. G. Danis Co., 1518 East First Street, for one-story foundry addition, 80 x 120 ft. Cost close to \$80,000 with equipment. Company also will build one-story addition, 30 x 170 ft., for storage and distribution. Geyer & Neuffer, Ludlow Arcade Building, are architects.

Frigidaire Division, General Motors Corp., 300 Taylor Street, Dayton, Ohio, has asked bids on general contract for five-story addition, 150 x 230 ft., for production of machine guns for Government. Cost close to \$1,000,000 with equipment. Schenck & Williams, Third National Bank Building, are architects.

Ohio Battery Co., 705 Tuscarawas Street West, Canton, Ohio, electric storage batteries and parts, has let general contract to E. H. Walker Construction Co., Zininger Building, for new two-story and basement plant, 85 x 145 ft., at 831 Market Avenue North. Cost close to \$65,000 with equipment.

Hoover Co., North Canton, Ohio, vacuum cleaners and parts, will begin erection of four-story addition, 80 x 120 ft., for production of shell fuzes for Ordnance Department, Washington. Warren-Hoffman Co., 312 Third Street, N. W., Canton, is general contractor. Cost close to \$400,000 with equipment.

Muehlhausen Spring Corp., Michigan Street, Logansport, Ind., flat and coil steel springs, plans one-story addition, about 50 x 140 ft. Cost close to \$50,000 with equipment. Henry C. Wolf, 316 Heath Street, is architect.

E. C. Atkins & Co., Inc., 402 South Illinois Street, Indianapolis, saws, tools, etc., has let general contract to Geupel Construction Co., Hume-Mansur Building, for one-story addition, 100 x 362 ft. Cost over \$200,000 with equipment.

Monsanto Chemical Co., 1700 South Second Street, St. Louis, has let general contract to William H. and Nelson Cunliff Co., 3320 Lindell Boulevard, for eight-story and basement addition, 60 x 82 ft., to phosphate division. Cost about \$250,000 with equipment.

City Council, Ada, Okla., has approved plans for new municipal airport, including steel hangar, with repair and reconditioning shop, oil and gasoline storage and distribution system, and other structures. Cost about \$100,000. Special election has been called to vote bonds in that amount. Financing will be arranged through Federal aid.

American Brake Shoe & Foundry Co., 1501 Macon Street, North Kansas City, Mo., plans two-story and basement addition, for which general contract will be let soon. Cost close to \$75,000 with equipment. Main offices are in New York.

Southern Aircraft, Inc., Dallas, Tex., recently organized, care of Gill & Bennett, Great National Life Building, architects (Grayson W. Gill, in charge), plans new plant on 20-acre tract near Garland, for manufacture of commercial and other type aircraft. Cost over \$150,000 with equipment. Company also has about 160 acres adjoining and will use for an airport for test flights and other service, with hangar, shop and other buildings.

Gallmeyer & Livingston Co., Straight Avenue, S. W., Grand Rapids, Mich., grinding machinery and parts, has let general contract to Owen, Ames & Kimball Co., Grand Rapids, for one-story addition. Cost about \$45,000 with equipment.

Packard Motor Car Co., 1580 East Grand Boulevard, Detroit, has let general contract to

O. W. Burke Co., Fisher Building, for one-story addition for assembling, with four-story office and operating building adjoining. Cost over \$1,000,000 with equipment. Company also has let contract to Barton Malow Co., 1900 East Jefferson Avenue, for foundations for machine shops and heat-treating building at new plant for production of aircraft engines for Government; also contract to Burke company for tunnel connecting plant buildings. Cost over \$175,000. C. A. Handeyside Construction Co., General Motors Building, is engineer.

Master Machine Works, Oxford, Mich., machinery and parts, has let general contract to Industrial Construction Co., 5315 Seminole Street, Detroit, for one-story addition. Cost close to \$45,000 with equipment. Ward & Baumgartner, Pontiac, Mich., are architects.

American Stamping Co., Burnham Street, Battle Creek, hose clamps, oil and grease cups, and allied stamped metal products, plans one-story addition. Cost over \$45,000 with equipment. Edward Tuttle, Battle Creek, is architect.

Central Steel & Wire Co., 4545 South Western Avenue, will begin erection of one-story addition, 60 x 200 ft., for storage and distribution, for which general contract recently was let to Mason, Rune & Sons, 6760 Stony Island Avenue. Cost about \$75,000 with equipment. Alfred Aelschuler, Inc., 28 East Jackson Boulevard, is architect.

Warner Electric Brake Mfg. Co., South Beloit, Ill., has let general contract to Cunningham Brothers, Inc., 359 East Grand Avenue, Beloit, Wis., for one-story addition, 120 x 140 ft. Cost close to \$100,000 with equipment.

Marine Oil Terminal Co., 1725 West Thirty-first Street, Chicago, plans new bulk oil storage and distributing plant on Cicero Avenue, with pumping station, steel tank storage units and other facilities. Cost close to \$200,000 with equipment.

Manitowoc Ship Building Corp., Manitowoc, Wis., is erecting one-story machine shop and one-story storage and distributing building for which contracts recently were let to Kasper Construction Co., 1203 North Sixteenth Street, and Hamann Construction Co., Reed and North Eighth Streets respectively. Cost over \$85,000 with equipment. This is part of general expansion program for vessel construction for Government.

Electric Machinery & Mfg. Co., 1331 N. E. Tyler Street, Minneapolis, Minn., motors, parts and other electrical apparatus, has asked bids on general contract for one-story and basement addition, 60 x 200 ft., primarily for a welding shop. Cost over \$85,000 with equipment. Toltz, King & Day, Inc., Pioneer Building, St. Paul, Minn., is architect.

Harley-Davidson Motor Co., 3700 West Juneau Avenue, Milwaukee, motor cycles, parts, etc., plans one-story addition, 35 x 120 ft. Cost about \$65,000 with equipment. Federal Engineering Co., 720 North Jefferson Street, is engineer.

Armstrong, Bray & Co., 308 North Loomis Street, Chicago, steel belt lacing and kindred products, plans one-story machine shop at Northwest Highway and Menard Street. Cost over \$45,000 with equipment.

Dreis & Krump Mfg. Co., Chicago, will increase production 15 to 20 per cent by a 120,000 sq. ft. plant addition, costing \$27,500. Company manufactures sheet metal working machinery, hand and power bending brakes and press brakes.

Western States

● **Board of County Supervisors**, Hall of Records, Los Angeles, asks bids until Dec. 10 for new one-story maintenance and repair shop, 40 x 127 ft., at 1640 Eastlake Avenue, for Flood Control District. Structure will include machine shop and automobile repair and service department, forge and blacksmith shop; a traveling crane will be installed. H. E. Hedger, 751 Figueroa Street, is chief engineer.

Pacific Can Co., 290 Division Street, San Francisco, has let general contract to F. R. Siegrist, 604 Mission Street, for new one-story plant, 100 x 275 ft., at Oakland, Cal. Cost

about \$150,000 with equipment. W. H. Ellison, Pacific Building, San Francisco, is engineer.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Dec. 18 for two gasoline-electric traveling jib cranes, each 20-ton, for Puget Sound Navy Yard (Specifications 10206).

Killefer Mfg. Co., 5525 Downey Road, Vernon, Los Angeles, agricultural implements, road tools, etc., has let general contract to E. S. McKittrick, 7839 Santa Fe Avenue, Walnut Park, for one-story addition, 60 x 220 ft., for storage and distribution. Cost close to \$50,000 with equipment. Company is a subsidiary of Deere & Co., Inc., Moline, Ill.

Lockheed Aircraft Corp., Burbank, Cal., has let general contract to H. W. Baum & Co., 232 South Van Ness Avenue, Los Angeles, for one-story addition to Plant No. 3. Cost about \$85,000 with equipment. John and Donald B. Parkinson, Title Insurance Building, Los Angeles, are architects.

Bureau of Reclamation, Denver, asks bids until Dec. 19 for four 32 ft. x 35 ft. fixed-wheel penstock gates for intake at Parker hydroelectric power plant, Parker dam project (Specifications 942).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 12 for four turbine-driven fuel oil service pumps, with four pump governors and spare parts (Schedule 4206) for Puget Sound Navy Yard; two combined auxiliary air and circulating pumps (Schedule 4211) for Mare Island yard.

Canada

● **Dominion Engineering Works, Ltd.**, Longueuil, Que., machinery and mechanical equipment, has let general contract to Atlas Construction Co., Ltd., 679 Belmont Street, Montreal, for one-story addition to plant No. 2, and improvements in present structure. Cost close to \$125,000 with equipment.

Canadian Industries, Ltd., Montreal, plans new one-story mill on 100-acre tract on Lake Ontario, near Kingston, Ont., for production of nylon (synthetic fiber). Plant will include storage and distributing buildings, steam power house, pumping station, machine shop and auxiliary structures. Completion is scheduled in fall of 1941. Cost about \$1,500,000 with machinery.

Canadian Foundries & Forgings, Ltd., Welland, Ont., steel castings, forgings, etc., will begin erection of one-story addition, for which general contract recently was let to Standard Steel Construction Co., Ltd., Fort Robinson, Ont. Cost about \$70,000 with equipment.

Canadian Liquid Air Co., Montreal, has started work on a new plant, 90 x 110 ft., on Seventh Avenue in Rosemount section, for manufacture of electric welding rods.

De Havilland Aircraft of Canada, Ltd., Postal Station L, Toronto, has plans by David Shepherd, 1244 Dufferin Street, associated with mechanical engineer, Edgar A. Cross, 991 Bay Street, and structural engineer, H. H. Angus, 1221 Bay Street, for assembly and repair plant in North York Township. Dope room building also will be erected. Cost, with equipment, about \$1,000,000.

Dominion Department of Munitions and Supply, Ottawa, acting secretary, Q. H. Turnbull, will call for tenders about Dec. 15 for \$3,000,000 airplane plant near Crumlin Airport, London, Ont.

Canada Wirebound Boxes, Ltd., 1000 Gerrard Street East, Toronto, has plans by J. M. Cowan, 122 Marguerette Street, for addition to cost \$75,000 with equipment.

Canadian Westinghouse Co., Ltd., Hamilton, Ont., has given general contract to Frid Construction Co., Ltd., 128 King Street East, for one-story plant addition, 300 x 800 ft. Hutton & Souter, 36 James Street South, architects.

Canadian Tube & Steel Products, Ltd., 5675 Hamilton Street, Montreal, has started work on \$50,000 plant addition. J. A. Leclair Dupuis, Ltée., 620 Cathcart Street, is general contractor.

Canadian Carborundum, Shawinigan Falls, Que., has awarded general contract to John Wickenden, 1413 Notre Dame Street, Three Rivers, Que., for plant addition, consisting of four buildings, to cost \$500,000.